
GROW
to
LEARN

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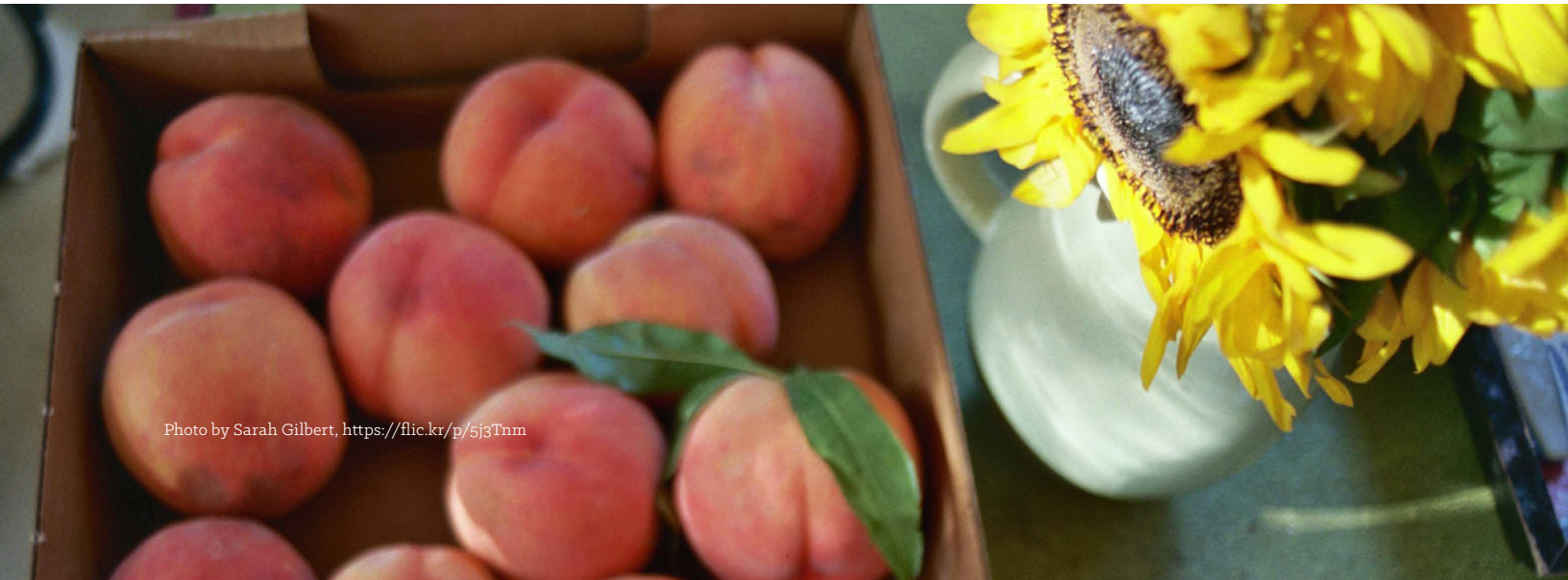
WELCOME

We are pleased to offer teachers and other school garden champions this guide to help you start, maintain, and sustain a school garden. This manual provides up-to-date information gleaned from the collective knowledge and experience of farmers and gardeners throughout our state and based on scientific research at the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS). The hands-on skills presented in this guide will support teachers in creating a learning environment where academic skills, particularly STEAM (science, technology, engineering, arts and math) come alive for students. The accessible format will guide you, step-by-step, through the stages of successful garden–from shaping your vision of a garden to building, growing, maintaining, and sustaining it for the long-term.

All sections will be updated regularly online to reflect the latest research and best practices for gardening in the Sunshine State. Each section offers the basic information you need, in addition to a "Digging Deeper" list of resources for learning more. Scattered among the guide are callouts featuring useful "Tips from the Experts" and "Best Practices."

Finally, this manual is not a curriculum, but a practical Florida gardening guide that complements the many excellent, evidence-based curriculae available. Our Florida climate presents challenges and opportunities that are unique to our state and not addressed in general gardening guides. School gardens present unique challenges for maintenance and management. We offer this guide as a unique and helpful resource for making school gardens beautiful and bountiful places to grow nutritious food and a vitalizing learning environment for our students.

Let's dig in!



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THE INTRODUCTION briefly describes the when, what, why, and how of school gardening.

GETTING STARTED looks at the important things that need to be considered before planting the first seed, including generating buy-in from your school community, envisioning an outdoor learning space, creating a budget, choosing a curriculum, and raising funds.

BOOTS ON THE GROUND will give you the information you need to choose the right plants, create a healthy garden environment to keep them growing to fruition, and then reap the harvest – the best part!

SUSTAINING THE GARDEN offers practical advice for strengthening the connection between the garden and school community with sustainable funding, a supportive volunteer program, and ongoing evaluation.

EXPANDING YOUR GARDEN offers some exciting and fun suggestions for enhancing the garden environment by expanding over time – from adding perennial fruit crops to creating pollinator habitats.

COMMUNITY GARDENING brings the learning garden out into the neighborhood.

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"Gardening is essentially practical. There is nothing better fitted to the healthful development of children. It affords opportunity for spontaneous activities in the open air and possibilities for acquiring a fund of interesting and related information; it engenders habits of thrift and economy; develops individual responsibility, and respect for the rights of others; requires regularity, punctuality, and constancy of purpose."

–from Children's Gardens for School and Home: a Manual of Cooperative Gardening, by Louise Klein Miller. 1904

INTRODUCTION *to Florida School* GARDENING

Every year, a growing number of teachers are incorporating gardening into the academic experience for their K-12 students. School gardens provide countless ways to engage students with hands-on learning opportunities. They also offer the opportunity for school staff, parents, and community volunteers to share skills, offer wisdom and experience, and enjoy the bounty and beauty of a growing garden.

WHEN DID SCHOOL GARDENING BEGIN?

The modern "school garden movement" can be traced to early 18th century Europe where, inspired by educational reformers like Jean-Jacques Rousseau, the value of nature in the education of children became popularized. Gardens were started to provide natural beauty in the schoolyard, to teach children the vocational skill of growing their own food, and to provide food for the school. Later, early 20th century school reformers in the United States advocated for a garden in every school. During the World Wars, school gardens sky-rocketed in popularity, becoming models for community Victory Gardens. The "back-to-the-land" movement of the 1960s and '70s ushered in another wave of interest in gardening with children. Today, the local food movement, combined with educational research demonstrating the value of experiential learning, has created another resurgence in school gardening. *

WHAT DOES A SCHOOL GARDEN LOOK LIKE?

School gardens can take many forms. They can be established directly in the schoolyard, in raised beds, in containers, or even in water. They can produce fresh and nutritious food to use in the cafeteria, to eat as snacks, to take home to families, or to share with those in need. They can beautify the school grounds, attract butterflies and other pollinators, and create native plant habitats.

WHY GARDEN WITH STUDENTS?

In whatever form a school garden takes, it can support and enhance the learning environment of the school. They help by engaging curiosity, nurturing environmental awareness, improving self-esteem and interpersonal skills, promoting healthy eating and physical activity, and fostering academic achievement. Students love being in a garden and taking care of plants, watching them grow from tiny seedlings to food-bearing plants over the course of the growing season. School gardening contributes to a nurturing learning environment for the entire school community and beyond.

* See references in back of book.

HOW DO I CREATE A SUCESSFUL SCHOOL GARDEN IN FLORIDA?

A Florida school garden will have some distinct differences from one grown in other regions of the country. Our particular climate and soils can be both a challenge and a boon to school gardening. This manual addresses the challenges and offers ideas for taking advantage of the positive aspects of Florida gardening. County Extension Agents with the UF Institute of Food and Agricultural Sciences (IFAS) have a wealth of experience and access to the latest research on optimizing gardens of all types. We are here to support your educational objectives and help make your Florida school garden a beautiful and bountiful place for students to learn.

DIGGING DEEPER

+ *Wilkinson Elementary School Garden*, Sarasota County, Florida. (2013). The EdChannel 20. http://www.youtube.com/watch?v=guCN5-BIszo&-feature=c4-overview&list=UURujkqhiAtkHHAXXMJ5AR4w.

+ Carter, C., (2010). *School gardens with Constance Carter.* Library of Congress. http://www.loc.gov/rr/program/journey/schoolgardens.html

+ *Children and nature worldwide: An exploration of children's experiences of the outdoors and nature with associated risks and benefits.* (2012). Children and Nature Network. http://www.childrenandnature.org/downloads/CECCNNWorldwideResearch.pdf

+ *Lessons in school-supervised gardening for the southeastern states.* (1919). Michigan State University. http://archive.lib.msu.edu/DMC/sgp/southveg/southveg.pdf

Photo by Jessica Lucia, https://flic.kr/p/86S5gF

GETTING STARTED

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Sean McCoy | Stacey Spriggs | Tom Wichman | John McLaughlin | Eva Worden

Before the first seed is even sown, a garden of any type requires careful planning. If this is your first school garden, you will be putting in some time initially gathering a garden team, assessing your educational goals for the garden, making decisions about what type of garden will fit those goals, finding a site where your garden will thrive, and putting together a plan for obtaining funds and supplies. It may sound overwhelming, but this is one of the most exciting parts of the gardening adventure. Taken a step at a time, this preparation is not only achievable, it can be creative and fun. Begin to build teamwork and enthusiasm before the shovel hits the soil.

PLANTING THE SEED | YOUR GARDEN VISION

Even though you are just starting out, and most of the specifics will be fully developed later, it is important to begin to identify a vision for your garden. It's crucial to plan and think creatively ahead of time in order to have some solid ideas to present to the school community.

BASIC QUESTIONS TO BE CONSIDERED

- *How many students will participate?*
- *How will it contribute to the learning environment of the school?*
- *How will it contribute to specific goals for students?*
- *What type of garden? In-ground? Raised bed? Container? Hydroponic?*
- *Who will be responsible for maintenance?*
- *Where will it be located? A convenient water source and full sun are key issues.*
- *How will you fund the start-up as well as long-term sustainability?*
- *How will the produce be used?*

GARDEN SPOTLIGHT | BUNNELL ELEMENTARY

Flagler County

The school gardens at Bunnell Elementary School have been growing for over fifteen years, and during that time period have grown in size to over fifty raised beds. The most recent addition includes hydroponic, aeroponic, and aquaponic systems. Through support from grants, community partners, and education foundations, these new additions are increasing learning opportunities for the school and surrounding community.

Bunnell Elementary School gardens began under the direction of Family Nutrition Program staff from the University of Florida IFAS Flagler County Extension and with help and cooperation from school staff and Master Gardener volunteers. The gardens had to be relocated several years ago because of school expansion and now reside in a large area next to the playground. There is a 40 foot greenhouse central to the garden that will soon house the new aquaponic system. Garden programs and activities have been managed over the last few years by the school's health teacher.

The students propagate some of the plants in the garden from seed and others are purchased locally. Cool and warm season gardens are planted, weeded, watered, and harvested by the students. Some produce from these garden beds are donated to a local food bank and other items are used in food demonstrations, nutrition lessons, taste tests, cooking shows and Ag Club programs. Second grade students are fortunate to have partnered with one of the local high school Future Farmers of America groups to help them learn about gardening.

Fourth and fifth graders from Bunnell Elementary School harvested, cleaned, and prepared collard greens from their own school garden. Many students had never tasted fresh greens before. The staff were thrilled to see how many students asked for seconds.

Individual classroom involvement has increased as teachers are finding new ways to incorporate garden activities into their classroom studies. At the conclusion of each school year, an event titled F.U.N.C.H. (Families United in Nutrition, Community, and Health) is held for students and the school community that showcases educational, health, and physical activities related to nutrition and the school garden.

"As educators we are continually astonished by the willingness of students to sample foods from the garden," states Coach Cathie. The garden has brought new food experiences to the students at Bunnell Elementary School and has changed the way they feel about eating veggies.

GROWING YOUR TEAM

It takes a village to grow a garden and your first task is to begin growing that village of supportive and interested people–your garden team. For most school gardens, the first stop is the principal's office. The principal's support is not only necessary to move forward, but he or she may also suggest other important members for your team within the school community, and possibly in the community at large.

Be sure to cast a wide net for members of your garden team. You will be surprised at the number of gardeners in your school and community. Enthusiastic non-gardeners can also be instrumental when it comes to helping facilitate something that will be positive for students.

GROWING YOUR TEAM | AT SCHOOL

+ *Fellow teachers bring ideas, enthusiasm, and expertise to the table as well as more students and potential volunteers.*

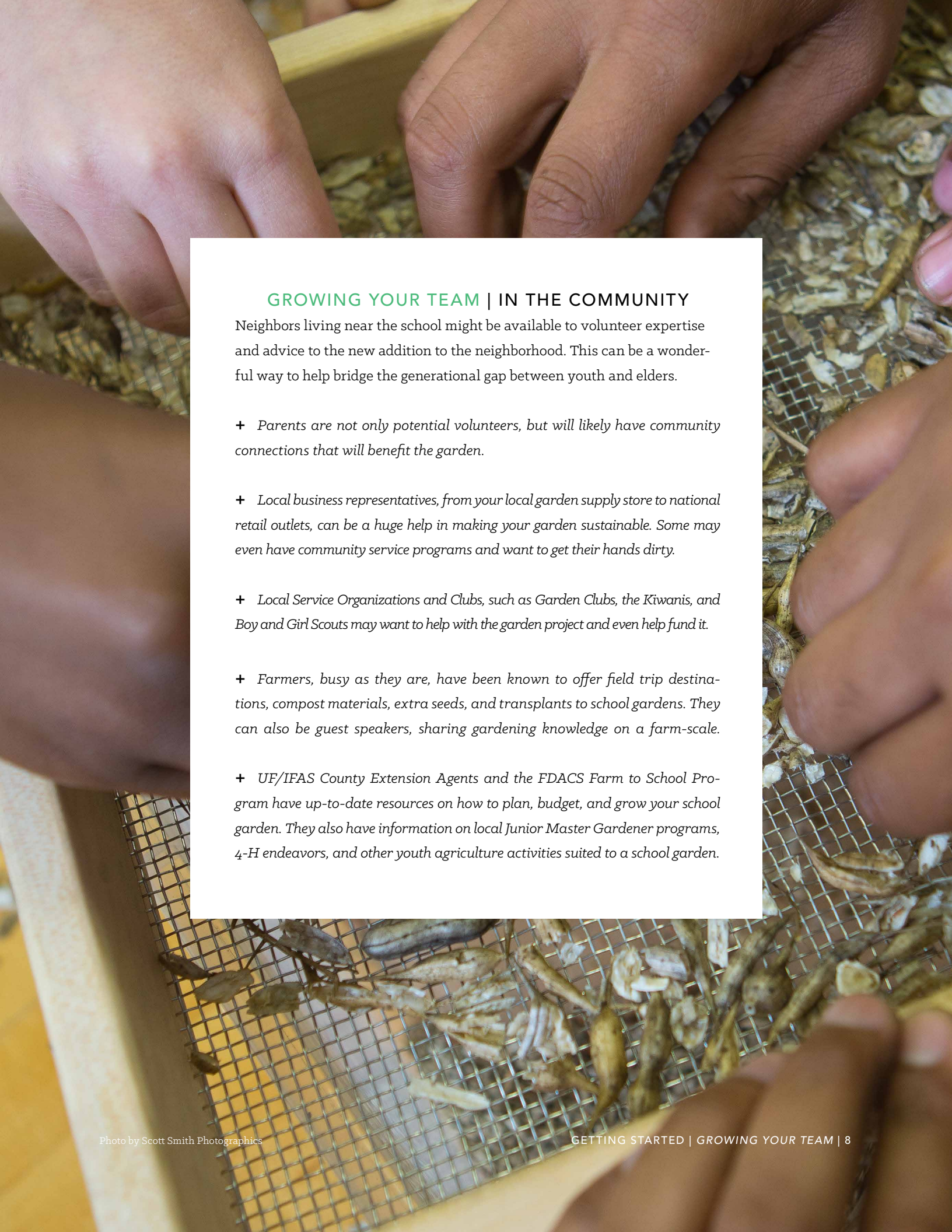
+ *Custodians, responsible for the care and maintenance of the school grounds, are vital allies in a successful school garden. They should not be responsible for care of the garden, but will want to work closely with those who are in charge in order to keep the schoolyard safe and beautiful.*

+ *Food Service Staff are great people to have on board, with their interest in nutrition and skills regarding food preparation and safety. They may also have funding and/or be able to lend space, tools, and supplies for food preparation.*

+ *After-school program and club staff may be interested in using the garden in their programs and helping with garden chores.*

+ *Parent-Teacher Associations may be able to provide volunteers and funding.*

Photo by Leonora Enking, https://flic.kr/p/7FmGZ3



GROWING YOUR TEAM | IN THE COMMUNITY

Neighbors living near the school might be available to volunteer expertise and advice to the new addition to the neighborhood. This can be a wonderful way to help bridge the generational gap between youth and elders.

+ *Parents are not only potential volunteers, but will likely have community connections that will benefit the garden.*

+ *Local business representatives, from your local garden supply store to national retail outlets, can be a huge help in making your garden sustainable. Some may even have community service programs and want to get their hands dirty.*

+ *Local Service Organizations and Clubs, such as Garden Clubs, the Kiwanis, and Boy and Girl Scouts may want to help with the garden project and even help fund it.*

+ *Farmers, busy as they are, have been known to offer field trip destinations, compost materials, extra seeds, and transplants to school gardens. They can also be guest speakers, sharing gardening knowledge on a farm-scale.*

+ *UF/IFAS County Extension Agents and the FDACS Farm to School Program have up-to-date resources on how to plan, budget, and grow your school garden. They also have information on local Junior Master Gardener programs, 4-H endeavors, and other youth agriculture activities suited to a school garden.*

Photo by Scott Smith Photographics

PLANNING & DESIGNING THE GARDEN

While you're gathering and meeting with the garden team, take the next step toward bringing the vision to life: design. This section presents some of the early decisions that will need to be made and an estimated budget based on those choices. More detailed information about constructing, planting, and maintaining your garden can be found in Section II: Boots on the Ground.

Planning your garden is an exciting exercise in creativity. Enjoy leafing through gardening books and magazines and browsing online. Visit school and community gardens, botanical gardens, or your local UF/IFAS demonstration garden (See "Digging Deeper" for a link to find locations). You will be inspired! Be sure to include your garden team and students in the process. They can offer valuable insights, and the more they are involved at the beginning, the more enthusiasm they will have for seeing the project through.

Throughout this creative process, garden plans will begin to develop. One way to move the process from brainstorming to actual planning by asking participants to put their ideas on paper and draw what they would like the garden to look like. Discuss the particular features of the garden that are most important to them. Which of these are feasible for your first garden effort? Which can be developed over time? Ask yourself how these elements connect with and support your teaching goals and standards. As your school garden begins to take shape in your mind, you can decide what type of garden will best suit your vision.

CHOOSING A GARDEN SITE

Where you locate your garden will be one of the most important decisions you make. The space will not only need to provide the right elements for a garden to thrive, such as lots of sun, healthy soil, and available water, but will also serve as an outdoor classroom. Therefore, you will need to consider both people and plants as you look for a site. That said, empty fields and spaces between walkways are possible spaces for a garden. Even spaces with asphalt and concrete can be used for container gardens.

Here are some things to consider as you look for the best possible space in your schoolyard:

SOIL | If the garden will be in-ground, is the area free from standing water which can harm plants and attract mosquitoes? Is the soil free of construction debris (gravel, building material, etc.)? Does the site support plant life (sod, weeds)?

IRRIGATION | Is it close to water supply? Is it municipal water or from a well? If from a well, has it been tested for potability and to determine pH and salinity? In addition, wells should not be located near livestock or a septic drain-field. Surface water (pond, lake, river, etc.) should not be used. Catchment systems, like rain barrels, should only be used for ornamentals. They should be properly located and exclude possible contamination from animals or other sources by using screening and/or lids on openings.

SIZE | Does it fit your garden plan? Is there room for students to work? Are there pathways between plantings and places to sit?

SUN | Does it get at least six hours of sunlight during the day, even in the winter months?

TOOL STORAGE | Is there a nearby place to store tools or to locate a storage shed?

SECURITY | Will the location discourage vandalism? Is it safe from foot traffic, playgrounds, and sports activities?

UTILITY LINE | Have you checked about underground lines that might be damaged by digging? Call 811 or visit www.sunshine811.com

ACCESSIBILITY & CONVENIENCE | Is the site easy for both students and teachers to access safely and conveniently? Have ADA standards been considered?

BEST PRACTICES

SOIL | SAFETY

+ *Locate gardens away from potential contamination sources (garbage, utilities, animals, water runoff, flooding, septic systems, etc.). Contact the utility companies or call 811, the national "Call Before You Dig" number, a few days before digging to ensure that you avoid gas or electric lines.*

+ *Identify soil history from all sources. Have soil tested to determine levels of contaminants such as chemicals, lead, etc., if there is a history or evidence of possible contamination.*

+ *Create reasonable barriers to keep wild animals away from the garden. Examples include fencing or cages over produce items such as strawberries, leafy greens or other foods that are eaten raw.*

+ *Consider purchasing soil that has been commercially packaged and labeled for growing food crops. Soil purchased from a commercial source ensures traceability.*

+ *Use non-toxic, non-leaching materials for raised-bed gardens, containers, stakes, or trellises. Do not use wood treated with copper arsenate, used tires, single use plastics, or old railroad ties.*

From "Food Safety Tips for School Gardens," USDA–See "Digging Deeper" for information on soil testing services. Contact your UF/IFAS County Extension agent for directions on how to collect and submit a soil sample. The sample analysis report will give you a fertilizer recommendation for your garden.

GARDEN TYPES

While it's possible to grow a garden indoors, a big advantage of Florida gardening is that we can grow outdoors almost year-round! There are a number of different ways to grow plants in your school garden: in containers, in raised beds, directly in the ground, in water, or you can use a combination of these methods. Regardless of the type(s), it's best to start small and leave room to grow as you become more experienced and confident. What type of garden fits your site, budget, and volunteer support?

IN GROUND | This is likely the least expensive system initially, but it's important to know the history of the soil and that it is contaminant-free. Drainage characteristics, soil pH, and soil texture also need to be considered carefully.

RAISED BEDS OR CONTAINERS | Both raised beds and containers are filled with a purchased growing medium instead of garden soil. Raised beds are large frames that are usually installed directly over the soil. Containers, on the other hand, can be used anywhere there is enough sun. They require minimal labor to prepare or construct and have the added benefit of being mobile.

HYDROPONIC | Hydroponic gardens are soil-less systems that use media or water and nutrients to help plants grow.

DIGGING DEEPER

+ *Designing a youth garden.* (2013). The National Gardening Association. http://www.kidsgardening.org/node/12111

+ *Food safety tips for school gardens.* (n.d.). US Department of Agriculture. http://nfsmi.org/documentlibraryfiles/PDF/20110822025700.pdf

+ Park Brown, S., Taylor, K., and Eubanks, E., (2002). *Demonstration Gardens in the UF/IFAS Extension. Cooperative Extension Service.* UF/IFAS Extension. http://edis.ifas.ufl.edu/ep108

+ Simon, P., (2013). *Creating a theme garden.* The National Gardening Association. http://www.kidsgardening.org/node/64104

+ *Soil quality indicator sheets.* (2009). Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=stelprdb1237387

CHOOSING A CURRICULUM FOR YOUR GARDEN

There is no denying the health benefits of fruits and vegetables, but it is not always easy to persuade children to try new foods. School gardens are the perfect teaching tools to increase acceptance and consumption of fruits and vegetables.

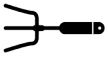
As the popularity of school gardens grows, so does the body of research validating them as a teaching tool. Core subject content, social skills, and life lessons can all be introduced and reinforced through hands-on gardening efforts.

The core subjects including Math, Science, English/Language Arts, and Social Studies can be taught and supported through fun, interactive gardening activities. Organizations such as Florida Department of Agriculture and Consumer Services, Florida Agriculture in the Classroom, Team Nutrition, and the Nutrients for Life Foundation are supporting this movement with evidence-based materials and curricula that make it simple to incorporate the garden into the classroom and correlate with state standards. Environmental Science, Soil Science, Agriculture, Health and Nutrition, and Genetics are all areas of focus that are currently supported by evidenced-based curriculum and available for use in school gardens (see chart for recommended curricula).

When choosing a curriculum for use in a school garden, be sure to consider the grade level(s), academic focus and abilities of students using the garden. If the garden will be a place for multiple classes to use, it will be important to coordinate with all teachers to be sure the garden is structured for everyone's needs. While early grades may be able to gather around a single garden bed, high school students may need several beds so that all students can participate. Remember to think about the abilities of all students and how the construction of the garden will affect their ability to use the garden for learning. There are a number of great resources for constructing gardens for those with special needs (see "Digging Deeper"). It is also important to think about how the structure of the garden will affect your ability to use it for various lessons. For example, if you wanted to use the garden in your science lesson and needed replications of an experiment, you may want multiple garden beds for this purpose.

Gardens are also a great way to strengthen positive social skills. In a study of children with learning disabilities, the school garden enhanced their nonverbal communication skills, exposed them to the advantages of ordering tasks, helped them form relationships with adults, and taught the children how to participate in a cooperative effort (Sarver, 1985). Gardening allows children to experience nature, teaches them about hard work and patience, and also teaches them that even with hard work and dedication, not all things turn out perfectly. The garden is nature's classroom. Utilize it as such and your children will reap the rewards, both mentally and physically.

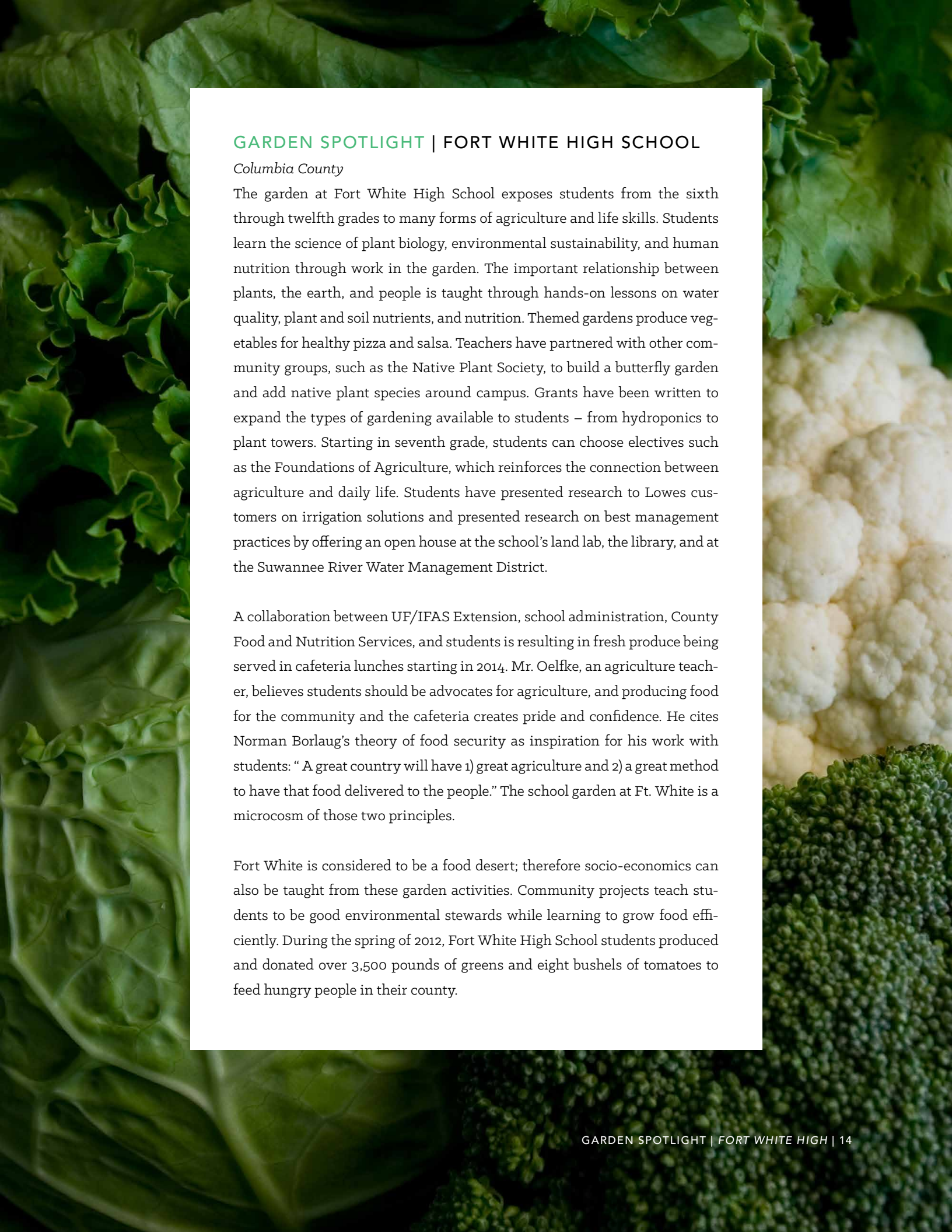
DIGGING DEEPER



+ *School Gardens are for Everyone.* (2013). The National Gardening Association. http://www.kidsgardening.org/node/12190.
+ *Gardening with Children with Special Needs.* (2013). The National Gardening Association. http://www.kidsgardening.org/node/11435
+ *Gardening with Special Needs: The Benefits of Horticultural Therapy.* (2013). Michigan State University. http://msue.anr.msu.edu/news/gardening_with_special_needs_the_benefits_of_horticultural_therapy

CURRICULA | CHILDREN & YOUTH

CURRICULA	AUTHOR	AUDIENCE	DESCRIPTION	MORE INFORMATION
Gardening for Grades	Florida Agriculture in the Classroom, Inc.	Grades Pre-K–12	Materials and lessons focused on Florida agriculture and guidance on planning, funding, creating and learning with a school garden.	http://www.flagintheclassroom.com/lessons.html#download
Eating from the Garden	University of Missouri Extension Service	Grades 4–5	A program to help children improve their eating habits by giving them a green thumb.	http://faitc.org/teachers/gardening-for-grades/
Grow It, Try It, Like It! The Great Garden Detective Dig In!	Team Nutrition USDA	Grades Pre-K and 3–6	Materials integrating both nutrition and gardening education into one curricula. Teach children about where their food comes from and the nutritional value.	http://teamnutrition.usda.gov/library.html
Gardening: Take Your Pick Gardening: See Them Sprout Gardening: Let's Get Growing	National 4-H Supply Service	Grade 4	Activity guides with exciting activities in 6 categories.	http://www.4-hmall.org/Category/4-hcurriculum-gardening.aspx
Growing Vegetable Soup	Lois Ehlert	Grades Pre-K–1	A book about growing and eating tomatoes, potatoes, corn, and more.	http://www.amazon.com/Growing-Vegetable-Soup-Voyager-Books/dp/0152325808
Health and Nutrition from the Garden	Junior Master Gardener	Grades 3–5	Guide for teaching nutrition, and food safety with gardening.	http://jmgkids.us/curriculum/health-nutrition-from-the-garden/
OrganWise Guys	OrganWise Guys, Inc.	Grades Pre-K–5	A series of lessons and materials to be used with children with organ-themed characters to introduce nutrition and garden topics.	http://organwiseguys.com/organwise-guys_educatortools.php
California Ag in the Classroom	California Ag in the Classroom	Grades K–12	A series of lessons and materials focusing on a variety of topics, including agriculture, gardening, food safety, genetics, nutrition, and the ecosystem.	http://learnaboutag.org/lessonplans/
Project Food, Land, and People's Resources for Learning Lessons	Project Food, Land, and People	Grades Pre-K–12	Fifty-five lessons that focus on the relationships between agriculture, the environment, and human populations. Teaches children about nutrition, gardening, farming, and a variety of other topics.	http://www.foodlandpeople.org/resources/resources-for-learning/brief-descriptions/#.UoKT12406Uk
Nourishing the Planet for the 21st Century	Nutrients for Life Foundation	Grades 3–12	A curriculum focusing on soil science and the nutrients plants need for optimum growth.	https://www.nutrientsforlife.org/for-teachers
Junior Master Gardener: Level One Junior Master Gardener: Level Two	Texas A&M AgriLife Extension Service	Grades 3–8	A two part interactive curricula ranging from health and nutrition to water and wetlands. Supplemental materials, such as Literature in the Garden, also help integrate the garden into the classroom.	http://www.agrilifebookstore.org/category-s/1838.htm?searching=Y&sort=7&cat=1838&show=90&page=1



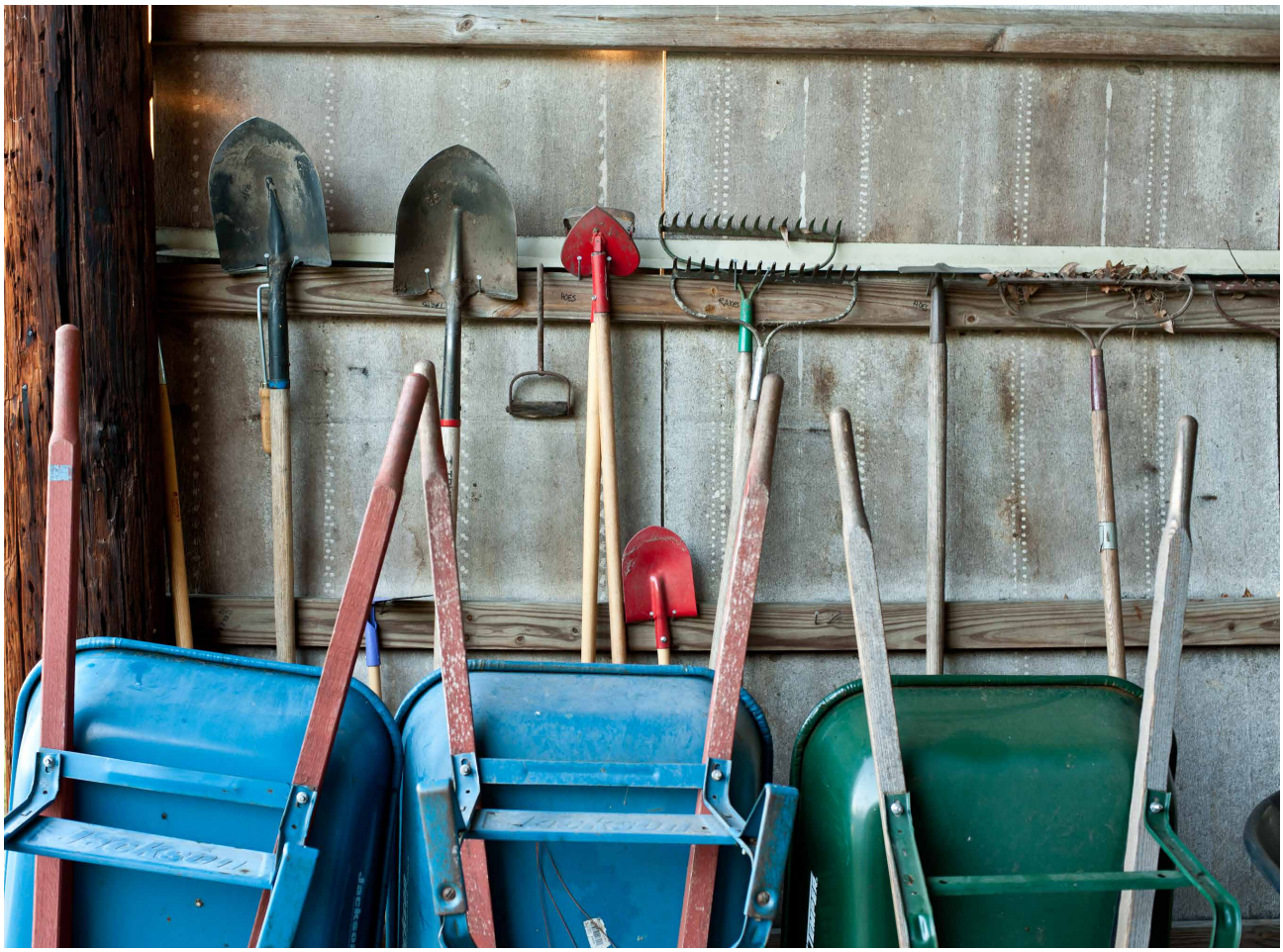
GARDEN SPOTLIGHT | FORT WHITE HIGH SCHOOL

Columbia County

The garden at Fort White High School exposes students from the sixth through twelfth grades to many forms of agriculture and life skills. Students learn the science of plant biology, environmental sustainability, and human nutrition through work in the garden. The important relationship between plants, the earth, and people is taught through hands-on lessons on water quality, plant and soil nutrients, and nutrition. Themed gardens produce vegetables for healthy pizza and salsa. Teachers have partnered with other community groups, such as the Native Plant Society, to build a butterfly garden and add native plant species around campus. Grants have been written to expand the types of gardening available to students – from hydroponics to plant towers. Starting in seventh grade, students can choose electives such as the Foundations of Agriculture, which reinforces the connection between agriculture and daily life. Students have presented research to Lowes customers on irrigation solutions and presented research on best management practices by offering an open house at the school's land lab, the library, and at the Suwannee River Water Management District.

A collaboration between UF/IFAS Extension, school administration, County Food and Nutrition Services, and students is resulting in fresh produce being served in cafeteria lunches starting in 2014. Mr. Oelfke, an agriculture teacher, believes students should be advocates for agriculture, and producing food for the community and the cafeteria creates pride and confidence. He cites Norman Borlaug's theory of food security as inspiration for his work with students: " A great country will have 1) great agriculture and 2) a great method to have that food delivered to the people." The school garden at Ft. White is a microcosm of those two principles.

Fort White is considered to be a food desert; therefore socio-economics can also be taught from these garden activities. Community projects teach students to be good environmental stewards while learning to grow food efficiently. During the spring of 2012, Fort White High School students produced and donated over 3,500 pounds of greens and eight bushels of tomatoes to feed hungry people in their county.



GETTING WHAT YOU NEED | MAKING A BUDGET & FUNDRAISING

Once you have your garden team and plan, you are ready for the next big step: obtaining supplies and funds. It is challenging and exciting to present your vision to people and organizations that can move it into reality. Be prepared to present the goals for your garden, including plans for possible future development, and a complete list of supplies you need to make it happen. Some organizations and individuals may be able to contribute the supplies directly, while others may donate money for the cause.

SUPPLIES FOR YOUR FIRST GARDEN

The first step is to make a list of the supplies you will need for your first garden.

SUPPLIES FOR IRRIGATION | PVC pipe, faucets, hoses, nozzles, watering cans, drip irrigation supplies, etc.

SOIL AMENDMENTS | compost, manure, potting soil, fertilizer

GROWING MEDIA | potting soil, compost, vermiculite, peat moss, etc.

PLANTS | transplants and/or seeds

FROST PROTECTION | cloth or plastic, stakes and pins

TOOLS | shovels, rakes, trowels, buckets, gloves, etc.

EDUCATIONAL SUPPLIES | books, signs, labels, etc.

PLANT SUPPORT | trellises, etc.

Photo by Kristen Grace Photography

ESTIMATED COSTS

The following estimated costs are representative of those encountered by existing school gardens. Prices may vary depending on the type of garden you choose as well as your location. A handy Budget Worksheet to help you calculate costs for your garden can be found in the Appendix.

CONTAINERS | Container-growing requires little labor and has the added benefit of being mobile. This allows the plants to be brought indoors during times of extreme cold. They are especially handy if you have a shortage of potential garden space. Your container garden can grow on a patio, in a parking lot, and even in the classroom, if there is adequate sunlight.

+ ***Self-watering Systems*** These containers are built to wick moisture from the bottom of the container, providing a continuous source of water to growing plants without needing to check on them as regularly. For example, Earthbox® is a widely-used product. A less expensive and equally effective self-watering container can be constructed from mostly recycled materials. See Appendix for directions.

Initial Estimated Cost
$10–$50 per container

+ ***Traditional Pot*** Plant containers can be made from a variety of materials, provided they have adequate drainage. Traditional plant pots may be donated free of charge from parents or other interested parties. They are also widely available at nurseries.

Initial Estimated Cost
$15 per pot

+ ***Hydroponic Gardens*** Hydroponic gardens are soil-less systems that use water and soluble nutrients to help plants grow. A very simple system consisting of a "kiddie pool" and Styrofoam® can be constructed economically and work very well with lightweight plants such as lettuce. This system requires transplants or a way to start plants if using seeds.

Initial Estimated Cost
$25 per pool system

RAISED BEDS | Raised beds are a good choice for a school garden as they provide contaminant free, amended, organic soil free of weed seeds, disease, or insects. They can be constructed of a variety of materials from stone, to rot-resistant wood, to synthetic materials. They are filled with a purchased growing medium. While no time is required to prepare the soil, time and labor are required to construct and fill the bed. The frame of the raised bed garden can be reused from year to year. However, reusing growing media for more than two growing seasons without treatment can result in an increase in plant disease and reduced fertility.

Initial Estimated Cost
$50–$200 per 100 square feet depending on material

Photo by Scott Smith Photographics

IRRIGATION | How you will water your garden depends on the availability of funds and also willing workers in the garden. On one hand, hand-held watering pots are a wonderful way for students to spend time observing plants while standing patiently over each plant. On the other, depending on the number of students relative to the size of the garden, this method may need to be supplemented by a more efficient system. Weekend and holiday watering would also likely require another method.

+ ***Hose and Nozzle*** This is the least expensive option and the easiest to set up, but it requires someone to be present at every watering event. It also uses more water than other systems.

Initial Estimated Cost *$50 per 100 feet*

+ ***Watering Cans*** Only the very smallest gardens could use these as the primary system of irrigation, but they are very good additions to any school garden, allowing students to water the plants directly.

Initial Estimated Cost *$5–$10 per watering can*

+ ***Soaker Hoses*** These are the least expensive of the "hands-off" watering systems, however, they do not always water evenly and can clog easily.

Initial Estimated Cost *$20–$40 for 50 feet*

MICRO-IRRIGATION | Micro-irrigation consists of a main irrigation line, generally a length of 1/2-inch poly tubing. Off of this main line you can run as many drip or micro-sprinkler emitters as needed. This type of irrigation can be run manually or by a timer. While it is possibly the most complicated and expensive to setup, this method of irrigation requires the lowest maintenance and least labor. It also conserves water.

Initial Estimated Cost *$60 for 100 square feet*

Photo by Mark Notari, https://flic.kr/p/bX6t24

OTHER START-UP SUPPLIES & COSTS

GROWING MEDIA | Media is the material in which the plants will be grown. This will be a start-up cost for constructed or assembled raised beds and the various small containers.

Initial Estimated Cost *$15–$25 per cubic yard (approximately 200 gallons) for "Mel's Mix," (see page 26). 2 yards = 1 4' x 8' bed*

FERTILIZER | All plants will need nutrients provided from some source of fertilizer. Purchase only the amount needed for a season to avoid pest-management and child-safety concerns associated with long-term fertilizer storage.

Initial Estimated Cost *$35 and up per 4' x 8' bed (depending on growing system and soil)*

TRANSPLANTS vs. SEEDS | Transplants are more expensive than seeds but, for some plants, they have a better success rate than directly sowing seeds. See chart on p.36 in Section II, "Boots on the Ground."

Initial Estimated Cost *$15 per tray of 100 plants (wholesale), $1 per plant (retail), or $5 per 100 seeds*

FROST PROTECTION | While Florida enjoys more sunshine and tropical temperatures than the rest of the country, much of the state will encounter freezing temperatures at least a few times during the school year.

Initial Estimated Cost *$75 for a 150' X 6' roll of frost cloth. Additional costs will include supports for the frost cover.*

TOOLS | Every garden needs tools. While money can be saved by asking volunteers to bring their own, tools should be included in the budget for the garden. Tools not only include the obvious necessities (for an in-ground garden) like a shovel, rake, trowels, and gloves, but also items like screwdrivers, hammers and a drill to construct the growing systems and frost protection. Also included in this estimate are irrigation timers and spare parts.

Initial Estimated Cost *$150*

EDUCATIONAL SUPPLIES | This will vary from garden to garden, but books, signs, and labels should be budgeted to help facilitate the learning goals of the garden.

Initial Estimated Cost *$50–$150*

TRELLISES & OTHER PLANT SUPPORT | Many plants require support in order to grow in a healthy and productive manner. Simple trellises can be built out of wood or bamboo poles strung with wire or string.

Initial Estimated Cost *$25–$100*

Photo by Kristen Grace Photography

FUNDRAISING

Finding the money to support your school garden is the final step in making it happen. You may be surprised at the money available close to home. Start there, then, broaden the appeal if you need to. All requests, from a friendly presentation to your local PTA to formal grant-writing, will require a carefully formulated list of supplies and costs. You're ready!

In establishing your garden team, you have introduced yourself and the project to a number of supportive stakeholders. Your first step will be to ask for their help. First, ask the school principal if the school budget can support the garden project. The school may be more likely to fund your garden project if the garden is shown to be an educational tool and classroom asset. The school food service staff may also have funds that could be used in a garden and nutrition program. Next, look to your parent/teacher organizations. These organizations may have funds to offer, or they may be willing to host a fundraiser to help bring in funds for your garden.

Next, consider community partners. Local businesses may be willing to support your garden project through donations and/or supplies. Garden and landscape centers, in particular, may have plants, tools, and advice to offer, as well as money. Also consider your local farm bureau as a funding source.

Local interest groups and service organizations can be another source of support. Garden clubs may not only offer monetary support, but also volunteer assistance, which comes with added garden skills and knowledge. Local service organizations, like the Kiwanis or Rotary Club, may be interested in helping fund the project as well.

Funds are also available on a national level. The National Gardening Association offers youth garden grants to schools developing school gardens. Many franchise organizations may also be willing to offer support to your garden project. Additionally, if your garden will have environmentally positive implications, you may be able to apply for grants from organizations such as the U.S. Environmental Protection Agency and Department of Agriculture. You will find a list of national and state organizations at the end of this section in "Digging Deeper."

One other avenue to consider is an actual fundraising effort. Many schools have raised money for their garden projects through a variety of fundraisers. Some schools have sold plants and vegetables raised in their garden, while others have made jams, jellies, and other crafts from the fruits of their gardens. Other schools have found it hard to make money with these types of efforts and have turned to more traditional efforts. Whatever you decide to sell, be sure that you will make money from the effort and not just break even.

The key to finding funding is not to be shy. Few of us enjoy asking for money, but think of it this way: You are offering an organization the opportunity to make an impact on young people's health. Nutrition lessons and outdoor exercise will give them a lifelong skill and enhance their educational experience. Many businesses and organizations are looking for ways to support the community. Well-planned projects with goals, objectives, and budgets will help these organizations recognize your garden as a worthwhile cause. See appendix for grant writing resources.

BEST PRACTICES

Sample School Garden Start-Up Budget

4' X 8' Raised Garden Bed Kits (2)	*$159.94*
Tools, Gloves and Wheelbarrow	*$158.52*
Heavy Duty Garden Hose, Nozzle, Watering Cans	*$46.54*
Soil– 4 Cubic Yards, Fertilizer & Compost	*$168.00*
Mulch	*$86.86*
Seeds and Starter Plants	*$51.32*
Seed-starting Potting Trays (3)	*$10.00*
Plastic Drop Sheets	*$5.00*
Recycled Cardboard Boxes and/or Newspaper	*$0.00*
ESTIMATED TOTAL	*$686.18*

(Actual budget submitted in a grant application by Stacy Spriggs, Community and School Gardens Coordinator, UF/IFAS Extension, Sarasota County.)

DIGGING DEEPER

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Photo by Scott Smith Photographics

Once you have your plan, your people, and your supplies, you're ready to pull on your gardening gloves and get to work. In this section we will start by discussing garden construction. Whether your garden is going to grow in-ground, in raised beds, in containers, or in the water, you will need to prepare a place for your plants to thrive. Next, we will focus on choosing the right plant at the right time of the year and how to get them off to a good start. You will learn about nurturing and nourishing your growing plants in the next section, which is all about soil nutrients, irrigation, and compost. As the season goes on, your garden chores will switch to maintaining a healthy place for plants, people, and pollinators. We will take a look at pests (insects, diseases, nematodes, etc.) which are the facts of life in any garden. Finally, we'll look at some ways to expand your garden as you grow in experience by saving seeds, attracting pollinators, growing perennials like fruit trees and mushrooms and/or expanding your hydroponic system. Like a newly planted seed, a garden is full of potential and possibilities. It's time to grow!

GARDEN CONSTRUCTION | LAYING THE FOUNDATION

CONTRIBUTORS from UF/IFAS
John McLaughlin | Eva Worden | Sean McCoy | Terry Brite DelValle | Stacy Spriggs | James M. Stevens | Tom Wichman

This section examines the different types of gardens, the materials, and the skills needed to be successful. Follow the links for detailed information on materials and construction compiled by experienced County Extension agents. Even more ideas and plans can be found in the "Digging Deeper" section.

Once you've decided on the type of garden that best suits your needs, it's time to schedule a work day and begin construction! This is a great opportunity to invite the people who have supported the garden quest and are willing to take it to the next level by getting their hands dirty. The garden team can make the work easier and more fun by planning ahead. Be sure to have the necessary supplies and clear directions on hand. Be prepared to coordinate volunteers so that everyone has a role in getting the garden off to a good start. Make sure to schedule the event well in advance so volunteers can save the date.

IN GROUND

The simplest type of planting bed is an area of cleared land at ground level that is improved through the use of soil amendments. As discussed in Getting Started, an advantage of the in-ground garden is the relatively low cost. The biggest disadvantage is the additional labor required to prepare the site, amend the soil, and maintain it weed-free throughout the growing season. It is important to have in-ground garden soil tested for nutrients by your UF Soil Testing Lab at least three months in advance of planting so that it can be amended and prepared for your plants. This time period is important if lime is recommended as it releases slowly and requires several months before its benefits are fully realized. IFAS soil labs can also check for lead contamination for a nominal fee ($15). Testing for further contamination is very expensive. If there is any doubt about possible contamination, it is best to try for one of the container systems below.

The easiest way to begin a new garden is using the "no dig" method. With this method, you break your garden preparation into two parts, at least three months apart. During the first workday, you can create a no-dig garden bed (More Information in "Digging Deeper") by spreading a deep layer of mulch and compost over the area you plan to use for planting. On the second workday, three months later, you can unveil your (relatively) grass and weed-free garden bed, which will be well-nourished and ready for planting. While this method requires some forethought, the actual labor will be much less than it would be to dig through healthy turf or weeds and then apply fertilizer and compost. Ideally, you can plant directly into the mulch with little effort and place the seedlings into healthy soil.

Another option is to rent or borrow a tiller to break ground. After clearing the grass with rakes, you can add composted organic matter to the beds, as well as any other amendments recommended after your soil sample is tested.

CONTAINED

While planting directly into the ground is the least expensive option, it is worth considering other options for several reasons. First, most Florida soil is composed of deep sand, which has little natural fertility and needs to be watered often. While this is not as prevalent as in other parts of the country, there is a concern about soil contamination, particularly if the school is built on the site of an older building. For these reasons, many schools have decided to use other options such as raised beds, containers, and hydroponics.

RAISED BEDS | Raised beds are a great option for getting your garden off the ground! They can produce a lot of veggies in a small space while contributing to the beauty of the school landscape. Raised beds offer a number of advantages. For instance, they are filled with a disease-free growing medium (potting soil) and easy to cultivate, they are less likely to be damaged by foot traffic, and they are a good option if there is a concern about soil contamination. The downside is that they are more costly than planting directly in the ground and they can require more irrigation due to the increased loss of moisture through the sides of the bed.

Traditionally, bed walls are constructed from wood, masonry, and synthetic lumber and can be built with a minimum of skill and expertise. There are also several possibilities for filling the beds, including purchased potting soil mixes or making your own–like "Mel's Mix" on page 29.

With enough volunteers, you may be able to construct raised beds, fill them, and plant all in one work day. It is fun, hands on work and students can assist with the construction and filling with a minimal level of skill. These can be planted immediately.

CONTAINER GARDENING | If you have a small area or don't have the capacity to grow a large garden, container gardening might work for you. Many plants grow in pots just as well as they do in the ground. In many ways, the requirements of a small container garden are very much like those of any garden: sun, water, healthy soil, and nutrients. But you may also consider how plants are grouped together and if there is room to grow. If there will be more than one plant in the same pot, be sure that all your plants meet the same requirements for water, sun, and nutrients. Also be sure that the size of the container matches the size of your plant (see table below).

When we think of container gardens, we usually think of clay or plastic pots. However, a wide assortment of containers may be used, ranging from hanging baskets and flower pots to tubs and refuse cans. Almost any container is suitable as long as it is sufficiently durable, has good drainage, and is large enough to hold the fully-grown plant or plants. In this respect, gardeners are limited only by their imagination. An old bathtub might yield prize tomatoes, while an old plastic beach ball cut in half could become an excellent herb container. Table 1 below provides examples of some commonly available containers.

Containers dry out more quickly than most in-ground gardens and require more frequent watering. Self-watering containers solve the problem with a reservoir for holding water that uses capillary action to deliver water into the growing medium, keeping the soil consistently moist. You can also make your own.

POTS FOR YOUR PLANTS

CONTAINERS	DIAMETER	HEIGHT	VOLUME	SUGGESTED VEGETABLES
Pot (plastic)	4 inches	3 ½ inches	1 pint	Individual small-size plants (ex: parsley, clumps of plants (ex: chives), or transplants
Pot (plastic)	6 inches	5 ½ inches	3 pints	Herbs, compact varieties, cljps, or groups of leaf lettuce, green onions, & radishes
Pot (plastic)	6 inches	6 ½ inches	1 gallon	Same as 6-inch pot. Also suitable for hot peppers and strawberries.
Pot (plastic)	8 inches	8 inches	1 ½ gallons	Same as 6-inch pot. Also suitable for cherry tomato, romaine, and like vegetables.
Planter (plastic)	10 inches	10 inches	3 gallons	Same as 8-inch planter. Also suitable for carrots, spinach, broccoli, Bibb lettuce, and bell pepper.
Basket (1/2 bu)	13 inches	9 ½ inches	4 gallons	Ideal for tomato, eggplant, cucumber, pepper, squash, beans, peas, and vegetables mentioned above.
Basket (plastic)	11 inches	12 ½ inches	5 gallons	Same as above.
Basket (1 bu)	1 ½ inches	11 ½ inches	8 gallons	All vegetables.
Barrels/drums	24–30	36 inches	30–55 gallons	Excellent for strawberries and lettuce.

TIPS FROM THE EXPERTS

A SIMPLE SOIL RECIPE

From Mel Bartholomew of Square Foot Gardening

http://squarefootgardening.org/square-foot-gardening-method

MEL'S MIX

1 part compost

1 part peat moss

1 part vermiculite

HYDROPONICS

GROW A GARDEN WITHOUT SOIL | Hydroponics is the growing of plants in any medium other than soil. There are a number of hydroponic systems on the market. The most basic are fun and simple to put together and are also quite inexpensive. One key advantage to hydroponic gardening is that many diseases, insects, and nematodes can be avoided by using the liquid media. A very simple system can be created using a plastic container. This can be anything from a bucket to a storage container to a child's swimming pool. The container should be filled with perlite and kept damp with a mix of water and soluble fertilizer. Short-term crops that like water such as lettuce, basil, mint, watercress, chives, scallions, beans, and peas are examples of crops that grow well with this approach.

DIGGING DEEPER

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GARDEN SPOTLIGHT | DRIFTWOOD MIDDLE SCHOOL

Broward County

Driftwood Middle School boasts a beautiful hydroponic garden as one aspect of their school garden program. In their outdoor classroom, students combine hydroponics with vertical gardening for a set up that is both space and resource efficient. Driftwood Middle School students grow strawberries, lettuce, kale, cucumbers and many other plants in their vertical towers. The middle schoolers enjoy the fruits of their labor in classroom tasting sessions.

Colleen Dietz is the enthusiastic teacher who is currently running the garden program. She integrates the garden seamlessly into curriculum by having students learn about the different nutrients that go into the water and linking that to their study of the pH scale. The students also explore a more global and historical aspect of hydroponics by studying cultures who have always used hydroponic systems.

PLANTS FOR YOUR GARDEN
WHAT TO GROW, HOW TO GROW IT & WHEN TO HARVEST

CONTRIBUTORS
Wendy Wilbur | Danielle D. Treadwell | Sydney Park Brown | James Stephens | Terry Brite DelValle | Susan Webb

A wonderful selection of vegetables and herbs can be grown in your school garden during most of the school year. Choosing vegetables for your particular region and getting them off to a good start are simple tasks that have a huge impact on your success. This section will look at plant selection, placement in the garden, and how to actually get them into the ground and growing.

CHOOSING PLANTS

Florida school gardeners are extremely fortunate to have a nearly year-round growing season that conforms very well to the school year. Florida gardens can be planted in both warm and cool seasons. Throughout the year, you may have multiple harvests, with the final one conveniently planned for the week before summer vacation. Check the recommended planting dates for your region and the "days to harvest" in the Florida Vegetable Gardening Guide (See Appendix) to see what will work for your garden. Keep in mind that "days to harvest" is from seed to harvest; if you are using transplants instead, the time period will be shorter.

Selecting vegetable varieties that are resistant or tolerant of pests is important for the health of your garden. Seed catalogs, seed packets, and transplant labels often indicate if pest resistance is a characteristic through statements or letter designations. For example, a tomato variety name may be followed with VFNTA indicating that it is resistant (in this case) to Verticillium (V) and Fusarium (F) wilt diseases, Nematodes (N), Tobacco Mosaic Virus (T), and Alternaria fungus (A). Choosing the right plant at the outset can eliminate a lot of future problems. For a list of the "Top Twenty Plants for Florida School Gardens" see Appendix.

SEEDS OR TRANSPLANTS?

There are two ways to get plants started in your garden– seeds or transplants. Some plants do much better when they are directly seeded (planted right into the garden soil where they will be growing). For direct-seeding, follow the directions on the seed package or in the garden guide. Plant at the required depth and spacing and be sure to water regularly, until they begin to sprout. Root crops like carrots, radishes, turnips, and beets do best when directly seeded.

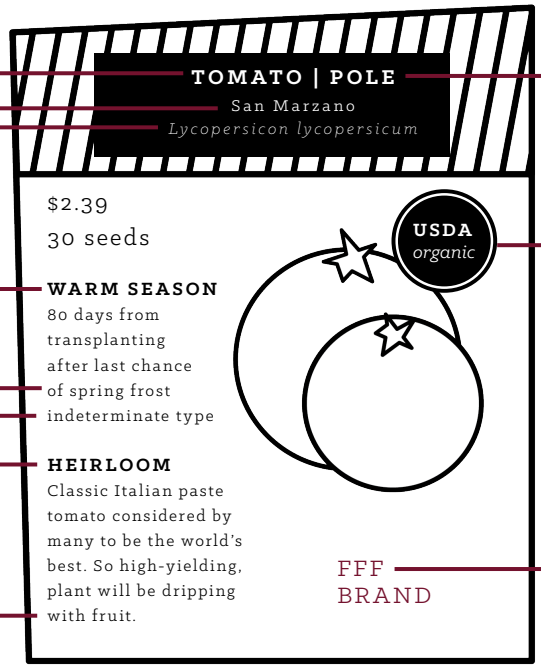
There are a number of advantages to using transplants (baby plants you can grow from seed or purchase from garden stores). If you are raising your own, you can care for them in a protected environment until they are strong enough to go out into the garden; there will be fewer disappointments and setbacks from unexpected freezes, heavy rainfalls or hungry insects. There is also a shorter wait between planting and harvesting. There are two other advantages: If you've delayed planting and have missed the window of planting from seeds, transplants allow you a 4–6 week catch up. Also, for plants that are picked over an extended period (like peppers) you really only need a limited number of plants, not all the potential plants from a seed packet. Buying them is even easier! Large chain stores don't always carry vegetable varieties that perform well in Florida. You may have better luck shopping at small retail nurseries or feed-and-seed stores that stock locally-grown transplants. Often your local UF/IFAS County Extension Agent can recommend good varieties for each region.

BEST PRACTICES

The "Florida Vegetable Gardening Guide," and its companion, the "Organic Vegetable Gardening Guide" are both available free online or from your UF/IFAS County Extension office. They offer up-to-date information about which varieties grow best in our state and how to plant and care for them (Also in Appendix).

Photo by Scott Smith Photographics

HOW TO READ A SEED PACKET | FRONT



COMMON NAME

VARIETY

LATIN NAME

POLE | a "vine" tomato *instead of bush*

ORGANIC | no chemical pesticides or inorganic fertilizers

80 DAYS | until you get to enjoy the fruit

INDETERMINATE | continues to grow and fruit for a longer time period

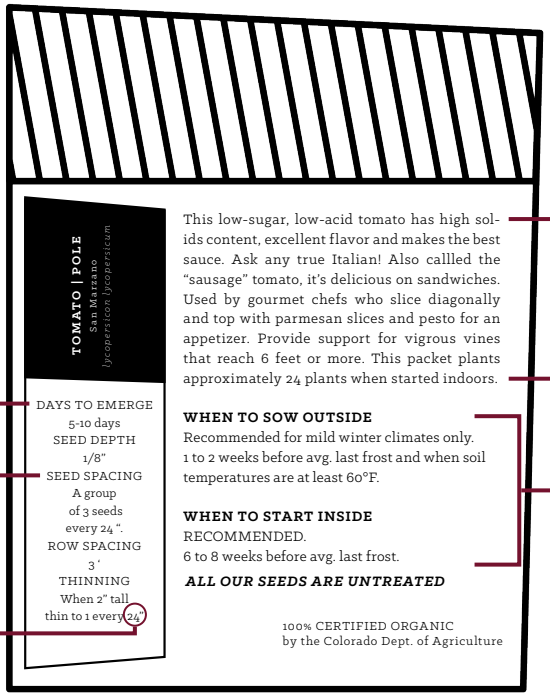
HEIRLOOM | a variety at least 50 years old, open-pollinated, not genetically modified

DISEASE CODES | resistance to various diseases and pests.

A SHORT LIST

V Verticillium Wilt
F Fusarium Wilt
FF Fusarium, races 1 and 2
FFF Fusarium, races 1, 2, and 3
N Nematodes
A Alternaria
T Tobacco Mosaic Virus
St Stemphylium (Gray Leaf Spot)
TSWV Tomato Spotted Wilt Virus

HOW TO READ A SEED PACKET | BACK



GROWTH | how long until seeds sprout

DEPTH | how deep to plant the seeds

24 INCHES | how far apart to plant the seeds

DESCRIPTION | cooking and plant care summary

INSIDE or OUT when and where to plant

HOW TO SOW A SEED | Refer to the seed packet or gardening guide for tips on how deep to bury the seeds and how far apart to sow them. A good rule of thumb is to plant a seed no deeper than twice its size. Once sown, be sure and mark the spot. Water gently to avoid washing them away and keep the soil moist until they germinate. If you have good germination, you may need to thin seedlings to get the correct spacing. You can either pull extra plants or you can snip or pinch them off close to the roots if it seems like pulling them might disturb the roots of adjacent seedlings. Very small seeds, like carrots and lettuce can be mixed with sand to make it easier to plant them shallowly and a reasonable distance apart. Large seeds like beans and peas are especially easy for small fingers to handle and can be planted one to a hole.

HOW TO TRANSPLANT A SEEDLING | It is important to carefully remove transplants from their pots. Gently lift soil from the pot with the handle of a plastic utensil, trying to keep as much soil as possible attached to the roots. The soil level of the formerly potted plant should be even with the ground level around the hole, so dig your hole with that in mind. (Tomatoes are an exception to this; tomato roots will sprout along the buried portion of the stem, so it's best to plant them deeply). Gently press the soil around the plant and water immediately.

HOW TO MAKE TRANSPLANTS | Some plants are best put into the garden as transplants and are very easy to grow from seed in a container. Seed trays can be filled with a very fine growing medium. Both trays and soil are usually available at garden stores. Seeds should be sown at the same depth indicated for sowing outdoors. They should be placed in a sunny, but protected area outdoors, in a sunny window with southern exposure, or under grow lights. Simple instructions for growing transplants indoors at minimum cost can be found in the Appendix: "Seed Starting Under Lights."

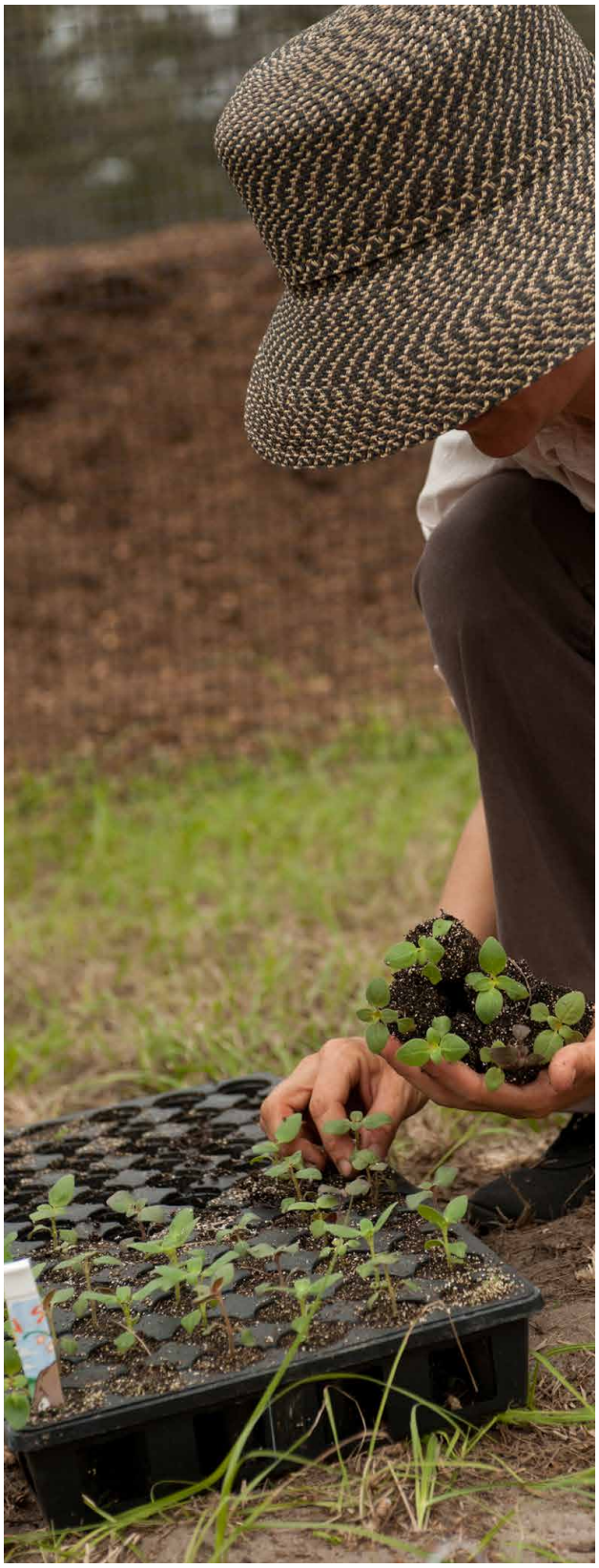


Photo by Kristen Grace Photography

BEST PRACTICES FOR STARTING YOUR PLANTS

TOP 20 VEGETABLES	DIRECT SEED	TRANSPLANT
Beans | *Green*	●	
Beets	●	
Broccoli		●
Brussels Sprout		●
Carrots	●	
Chard, Swiss		●
Corn	●	
Cucumber	●	
Eggplant		●
Greens | *collards, kale etc.*		●
Lettuce		●
Peppers		●
Pumpkins | *Seminole*	●	
Onions | *Sweet*		● *(sets)*
Peas | *Sweet*	●	
Potatoes	● *(from seed potatoes)*	
Radishes	●	
Roselle	●	●
Tomatoes		●

MULCHING | Mulch is any material placed on the soil surface around plants. Mulch provides many benefits, including conserving soil moisture, conserving nutrients, reducing soil erosion, reducing crop loss from nematodes, reducing weed growth, providing a barrier between fruit and soil, and moderating soil temperature. Organic mulch can attract many insects, including beneficial spiders and ground beetles, but may also attract organisms like slugs or snails that can damage crops. Organic materials most commonly used for mulching are oak leaves, grass clippings, Bahia hay, pine straw, and mature cover crops, which have been cut and returned to the garden as mulch. Apply mulch before or after seeding or transplanting, being sure mulch does not touch plant stems, which may cause them to rot. Generally, 2–4 inches of moderately packed mulch is recommended to prevent weeds. Hardwood or pine mulch chips, underlaid with newspaper, are best used in walkways and border areas around the garden where they can provide a surface to walk on when the garden is wet and will reduce weeds. Do not use these mulches in the garden. Woody mulches are slow to break down, and the process can rob plants of nutrients.

DIGGING DEEPER

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TIPS FROM THE EXPERTS

FUN THEME GARDENS

You can choose plants for your garden, or a section of it, with a particular theme in mind that corresponds with the curriculum or student interests! Some examples include...

SALSA
PIZZA
SALAD
ALPHABET
HERB
RAINBOW
CULTURAL
STONE SOUP
SENSORY
BUTTERFLY

*See "Digging Deeper" for more ideas

Photo by Keri, https://flic.kr/p/bChQuX

TIPS FROM THE EXPERTS

KEEP A LOG

Your garden is a living scientific experiment on what grows in your area and the particular micro-system of your location. Keeping a careful log of varieties planted, when you planted, location in the garden, pest challenges, freeze dates, how much was harvested, etc., will help with both evaluation and future planning.

Photo by nomsalina, https://flic.kr/p/4Jbqpx

ARRANGING CROPS

The careful placement of plants in an in-ground or raised bed garden is important. Consider the following when deciding how to arrange your plants in your garden area.

OPTIMAL SUNLIGHT | Run rows north and south so that exposure to sunlight is even for all rows. Also place tall plants and trellised crops at the north side of the garden so they will not shade smaller plants. Remember the sun will be low in the southern sky during winter.

WALKWAYS | Allow adequate space between rows so that groups of students can walk through without stepping on plants or tripping on raised bed supports.

PLANT LIFESPAN | Crops that span more than one season, such as strawberries or perennial crops that persist through many seasons, should be placed to one side of the garden so they do not interfere with seasonal preparation of the garden.

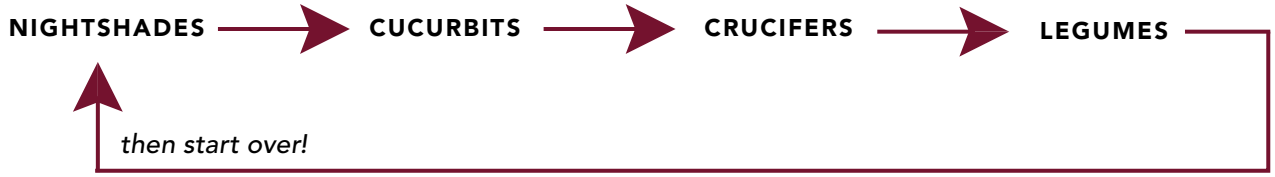
SPACE & INTERPLANT | Be sure to use proper spacing so plants have room to grow. Interplant fast-growing crops like radish among slower-growing ones (like carrots). Fast-growing crops are out of the way before the slower-growing crop needs the space.

POLLINATION | Plant sweet corn in blocks rather than in single rows so that ample pollen is present in the air around the corn stalks. This practice should result in better pollination and full, mature corn cobs.

CROP ROTATION | Design your garden so that crop rotation is practiced, and that vegetables from the same family are not planted in the same location more often than once every three years. Vegetables belong to plant families. For example tomatoes, peppers, and potatoes all belong to the same family. Simply divide your growing space into a number of distinct areas, identify the crops you want to grow and then keep plants in the same family together in one area. Every year the plants grown in each given area are changed, so that each family (with its own requirements, habits, pests and diseases) can have the advantage of new ground.

Many gardeners find it helpful to draw a sketch of the garden and the succession of crops to be planted. Try to plan at least 2 years in advance; 3–5 years is even better. Refer to the Florida Vegetable Gardening Guide in the Appendix for planting dates and plant families to help plan crop succession.

CROP ROTATION CATEGORIES



CROP CATEGORY EXAMPLES

NIGHTSHADES | tomato, potato, eggplant, pepper

CUCURBITS | watermelon, cucumber, squash, zucchini, cantaloupe, pumpkin

CRUCIFERS | cabbage, kale, broccoli, turnips, cauliflower, collards

LEGUMES | beans, peas, southern peas

DIGGING DEEPER

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Photo by Melissa, https://flic.kr/p/8aB2dR

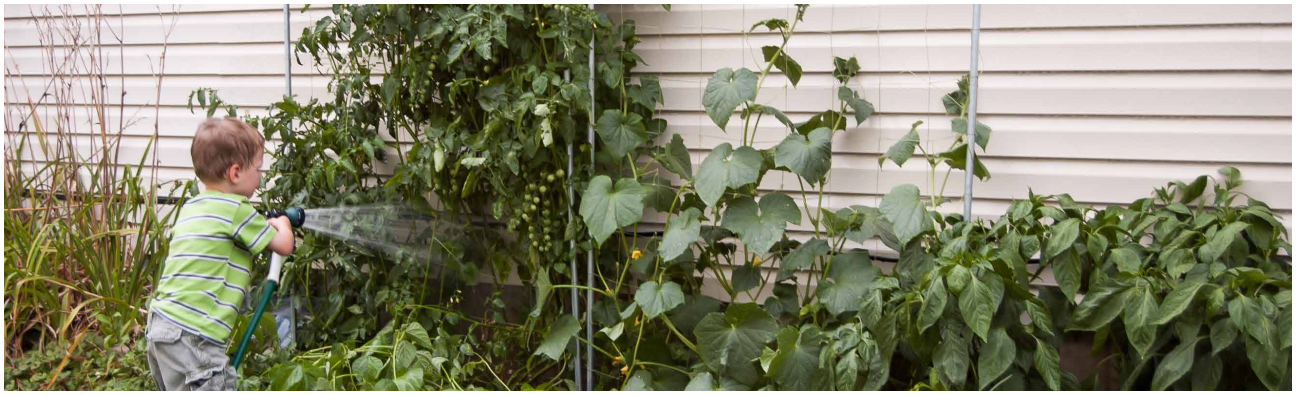
MAINTAINING THE GARDEN

CONTRIBUTORS from UF/IFAS

John McLaughlin | Eva Worden | Danielle D. Treadwell | Sydney Park Brown | James Stephens | Susan Webb | Amanda Gevens | R.A. Dunn | G. Kidder | D. Short | G.W. Simone | Wendy Wilbur

Setting out plants is exciting and fun for everyone involved, but it's in the day-to-day care and observation of the garden that your students will learn the most. Learn together how to nurture your growing plants and look for signals of what they need. This section provides information on how to maintain your garden throughout the school year by watering, weeding, fertilizing, composting, checking for pests and disease, and "putting it to bed" for the summer. The work you put into the garden will result in a bountiful harvest as well as a crop of budding scientists.

Photo by Southern Foodways Alliance, https://flic.kr/p/4Xa5XP



WATERING

Watering may be the most important factor in the long-term success of your garden. How much and how often depends on the growth stage of the plants, the type of soil, and how much natural rain the garden has received. Giving the plants enough water–but not too much–is vital for the success of your garden.

During the period immediately following planting or sowing, frequent irrigation, one or more times per day, is required to maintain soil moisture. Ideally, soil should feel similar to a wrung-out sponge (not soaking wet). But for established plants, irrigation is best done on a schedule, with a reliable, measurable amount of water being applied on a regular basis.

Young plants need frequent, but light irrigation. It's important that enough water is applied to reach the root zone, but not so much that the water washes nutrients through it. Established plants need more water in order to penetrate their root system, but do not need to be watered as often. Sandy soils demand more frequent irrigation than clay, muck or organic soils. Using a rain gauge will help you determine if the rain your garden has received is sufficient, or if additional water is required.

There are a number of ways to irrigate your garden, from hand-watering to more complex built-in systems. Most school gardens incorporate some hand-watering into the irrigation plan even if they have an alternate system. Hand-watering allows students of all ages to directly care for and observe a plant while they water it. A hose or a watering can can be used. With either one, students can be taught to direct the spray or stream to the soil at the base of the plant where it can filter down to the roots and avoid wetting the leaves as much as possible. Since youger students will often water only until the soil looks moist, you can show them how to poke their finger into the soil to see how deep the water has reached. A more accurate way of measuring the amount of water your plant is receiving is to make marks every inch on a small can, like a tuna fish can, near the plant you are watering with a hose and nozzle or watering can. Time this process and you will have a guide for future watering. Water until the shallow can is filled to the 1 inch mark; divide the time it took into two and this will be the amount of time you water twice a week.

Except for the smallest gardens, you will need to consider other sources of irrigation as well. Sprinklers are designed for broadcasting water over a large area. While inexpensive, a sprinkler wastes water and in many instances encourages disease by unnecessarily wetting foliage.

As a rule of thumb, vegetables should receive a total of 1"–2" of water per week, spread out if possible to deliver one-half inch at a time. Another indicator of water need is the condition of the soil, where the upper 1"–2" should be allowed to dry out before providing additional water. Approximately 65 gallons of water will be needed to provide 1" of water for every 100 square feet of plant bed.

Photo by Adam Tuttle, https://flic.kr/p/dDXUuU

TIPS FROM THE EXPERTS

MAKE | RAIN GAUGE

A simple rain gauge can be made by using a permanent pen to mark 1/2" increments on any straight-sided clear container, such as a jam jar. Make sure that the diameter of the container opening is the same as that of the base.

–John McLaughlin and Eva Wordin, Miami-Dade UF/IFAS Extension

MAKE | MILK JUG OLLA

A simple gravity system can be made from inexpensive materials for a small garden.

+ Freeze water in a gallon-size jug.
+ Using a hammer and finishing nail or a drill, make holes an inch apart across the entire surface of the jug, leaving the top 2" of the jug (the part that will be above the ground) hole-free.
+ Put the jug in the garden leaving an inch or two above ground and plant several plants around it so their roots are nearby.
+ Fill the olla with water and cap it, checking every few days to see if it needs a water refill.

These can also be used in a container garden, using a smaller one-liter soda or water bottle.

–John McLaughlin and Charles Yurgalevitch, UF/IFAS Extension, Miami-Dade

Photo by Kristen Grace Photography

INSTALLED IRRIGATION SYSTEMS | There are a number of efficient, installed irrigation systems that supply water directly where it is needed - at the roots of the plants. As a result, water is not wasted on leaves or soil, and evaporation and run-off are greatly reduced. The least expensive and simplest hose to install for a very small garden is a soaker hose, which can be purchased at a garden supply store. "Micro-irrigation", a more complex system that uses tiny sprinklers, drip emitters, or drip tape are more complicated to install, but highly recommended for the school garden. Any of these can be put on a timer at the water source, thus saving time and weekend trips to the garden for watering. Your local UF/IFAS County Extension agent or irrigation company can advise you on their installation and practicality for your particular garden.

COLLECTING WATER | Cisterns and rain barrels can be a great way to save water by rain collection, but due to potential contamination by wildlife, it is best to use this water on ornamental plantings rather than on edible crops. Learn more about watering your garden–from hand-watering to irrigation systems in the "Digging Deeper" section.

WATER TROUBLESHOOTING | Too much or too little soil moisture and inappropriate methods of applying water can all cause visible signs of plant damage and disease. Too little soil moisture causes wilting. Too much water can increase mold, fungi, weeds, and pests.

Too much soil moisture encourages root and stem rot. When roots aren't functioning, nutrients and water aren't absorbed. Foliage turns pale in color and the plant wilts and dies. Again, regular scouting for problems in the garden will alert you to irrigation problems as well as other concerns and will also be a good way for your students to hone their observation and diagnostic skills.

DIGGING DEEPER

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Photo by Kristen Grace Photography

WEEDING

Weeds are simply plants growing in the wrong place. Unfortunately, they will compete with your plants for water, sun, and root space. While mulching will cut down on the number of weeds, their seeds are lying just below the surface waiting to sprout under the right conditions. It's best to keep a close eye out for them and pull them when they are young. Never let weeds grow to the point of flowering and producing seed, or you will find more among your plants. Mowing around the outside edges of the garden where weeds grow will help prevent their seeds from drifting into the garden beds. Appendix – Top Twelve Weeds of Florida–is a helpful guide for identifying the unwelcome plants sprouting in your garden.

Keep adding mulch as the season progresses to reduce the need to weed. As the garden season wears on, the mulch you added initially around seedlings will begin to break down, improving soil structure and adding nutrients like a slow release of fertilizer. Adding mulch to maintain a depth of at least 2"–3" will continue to aid in weed suppression and water retention and continue the cycle of soil improvement. More information on mulching is found in the previous section.

DIGGING DEEPER

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Photo by Theen Moy, https://flic.kr/p/goWDp3

FERTILIZING

Plants, like people, need the proper nutrition to help them grow well. Fertilizers are composed of minerals, and many of the same minerals that are important for human health are also important for plant health. Too much, or too little, fertilizer will have a negative impact on your garden's growth and development. Commercial fertilizer comes in a number of different formulations, or combinations of nutrients and their relative concentrations in the mix. The top three essential nutrients for plants are nitrogen, phosphorus, and potassium, or N, P, and K, as they are known by their chemical element abbreviation, and are found in nearly all fertilizer formulations. Several curricula address crop nutrition in greater detail. The "Digging Deeper" section below contains several UF/IFAS Extension documents with more information on fertilizer nutrients and their effect on plant health.

Most plant nutrients are provided by the soil and will increase their availability by fertilizing. You are ahead of the game if you have made an effort to incorporate organic material into your garden and had your soil tested for additional nutrient needs. Similarly, carefully choosing and mixing a growing medium for raised beds or containers will help your plants get off to a good start. Soil with plenty of organic material can increase water holding capacity and help retain nutrients in soil. As your garden grows and the plants take up some of these nutrients, they will need to be replenished.

Both organic and synthetic fertilizer can contribute to plant health. One advantage to organic fertilizer is that it naturally contains many micronutrients that your plants need. Another is that organic fertilizers slowly release nutrients as they break down into forms that can be used by the plant. Good results can be obtained by using one or the other, or a combination of both.

No matter what fertilizer you use, it's very important to use the recommended amount. Over-fertilizing can encourage excessive growth, often at the expense of the edible portion of the plant, and in extreme cases, can kill plants by interfering with metabolism. In addition, nutrient leaching and surface run-off are significant contributors to water pollution. Under-fertilization slows growth and development and leaves plants weak. Purchase only the amount needed for a season to avoid degradation, pest-management, and child safety concerns associated with long-term fertilizer storage.

Photo by Susy Morris, https://flic.kr/p/8pXwxi

READING THE FERTILIZER BAG

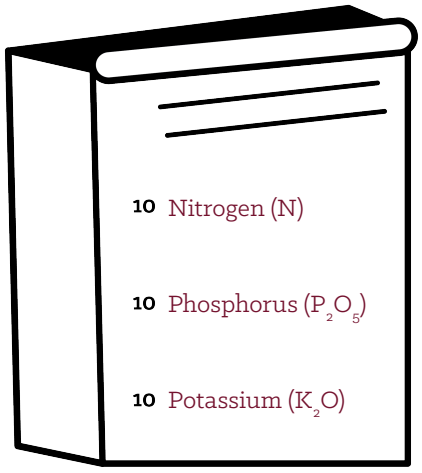
All fertilizer labels have three bold numbers. The first number is the amount of nitrogen (N), the second number is the amount of phosphate (P_2O_5) and the third number is the amount of potash (K_2O). These three numbers represent the primary nutrients (nitrogen (N), phosphorus (P), potassium (K). This label, known as the fertilizer grade, is a national standard.

A bag of 10–10–10 fertilizer contains 10 percent nitrogen, 10 percent phosphate and 10 percent potash.

Fertilizer grades are made by mixing two or more nutrient sources together to form a blend, that is why they are called "mixed fertilizers." Blends contain particles of more than one color. Manufacturers produce different grades for the many types of plants.

You can also get fertilizers that contain only one of each of the primary nutrients. Nitrogen sources include ammonium nitrate (33.5–0–0), urea nitrogen (46–0–0), sodium nitrate (16–0–0) and liquid nitrogen (30–0–0). Phosphorus is provided as 0-46-0 and potash as 0–0–60 or 0–0–50.

Other nutrients besides N, P, and K are required for plant growth, and may or may not be included in your fertilizer. Be sure to read labels carefully.



*See References page for source of information.

CALCULATING NUTRIENT CONTENT

To calculate the pounds of nitrogen in a 50 lb bag of 10–10–10 fertilizer, multiply 50 by 0.10. Do the same for calculating the amounts of phosphate and potash. A 50 lb bag of 10–10–10 contains a total of 15 lbs of nutrients: 5 lbs nitrogen, 5 lbs phosphate and 5 lbs potash. The remaining weight is filler, usually sand or granular limestone.

ANOTHER EXAMPLE | 50lb bag of 8–0–24 fertilizer

+ To calculate the pounds of nitrogen: Multiply 50 by .08, which equals 4.
+ To calculate the pounds of phosphate: There is no phosphate in this bag of fertilizer.
+ To calculate the pounds of potash: Multiply 50 by .24, which equals 12.
+ A 50 pound bag of 8–0–24 fertilizer contains a total of 16 lbs of nutrients: 4 lbs nitrogen, 0 lbs phosphate, and 12 lbs potash. This would leave us with 34 lbs of filler.

SELECTING A FERTILIZER GRADE

The best way to select a fertilizer grade is to have your soil tested. The soil test report will recommend a fertilizer grade for your use. The report also comes with a management note that provides guidelines for supplementing nitrogen for lawn and garden crops.

TYPICAL GARDEN GRADES INCLUDE

5–10–5 | 5–10–10 | 10–10–10 | 8–0–24 | 6–6–18

SPREADING FERTILIZER

Have you ever seen a lawn that looked like it had different colored stripes? This was probably caused by spreading fertilizers the wrong way. To make sure that the color and growth of your plants are the same, fertilizers must be spread evenly. The most popular types of fertilizer spreaders are the drop spreader and the cyclone spreader. Cyclone spreaders generally provide the best results. Make sure when you spread the fertilizer that you overlap your spread pattern by applying half the material in one direction and the remainder in the opposite direction. Break up any clumps so that the fertilizer won't get clogged in the spreader.

TIP FROM THE EXPERTS

SOIL | REGULAR TESTING

Regular soil testing enables you to find out the makeup of your soil and determine how much lime and fertilizer you may need to amend it. It's important to know your soil and to keep improving this crucial component in your landscape and garden. To find out what you need to do to ensure optimal plant growth, you should know each of the following attributes of the soil.

+ CURRENT pH LEVELS | pH is measured on a scale of 1–14. If your soil is below 7, it is acidic and if it is above 7, it is alkaline. Certain essential elements for plant growth are most available for absorption when the soil is close to neutral. Generally speaking, most plants and vegetables do best at a pH of 6.5, but there are exceptions. Blueberries prefer that pH is at 5.5–4.0.

+ FERTILITY LEVELS OF PRINCIPLE NUTRIENTS | Our Florida soils naturally have nutrients. A soil test report will include recommendations regarding soil amendments.

Soil tests are relatively inexpensive ($7). Contact your UF/IFAS County Extension agent for directions on how to take a sample and where to have it tested.

– Wendy Wilbur, UF/IFAS Alachua County Extension

Photo by Middleton Archaeological Society, https://flic.kr/p/cLd2am

GARDEN SPOTLIGHT | MEADOW WOODS MIDDLE SCHOOL

Orange County

During the last three school years (2011–2014) the UF/IFAS Extension Family Nutrition Program (FNP) in Orange County has provided eleven interactive and exploratory lessons in gardening and nutrition to middle school students. The students in this program participate in Exceptional Student Education (ESE) and need specially-designed instruction. The purpose of ESE is to help each child with special needs in school and prepare for life after school. FNP staff and school administrators felt like gardening, along with nutrition education, was a great way to integrate nutrition and science while providing ESE students with the hands on opportunity to discover vegetables. The environment also encourages positive change in vegetable intake and helps gain valuable life skills. Overall 10 middle school ESE classes have participated in the 11-week program and a total of 36 individual raised bed vegetable gardens were started and maintained during the program. Orange County Public Schools (OCPS) selected the program to be highlighted as part of the OCPS Garden and Nutrition Spotlight Video used for public relations and published on the the school board website and YouTube page.

AMENDING WITH ORGANIC MATERIALS

Plant nutrient deficiencies can often be diagnosed by symptoms that affect the plant's appearance, such as leaf color and shape, as well as abnormalities in the developing fruit. Careful, regular observation of plants by students can help spot problems early before the plant is weakened. Your UF/IFAS County Extension agent can help you diagnose diseases caused by nutrient deficiencies and help you put together a nutrient/fertilizer program for your garden.

In nature, earthworms, pillbugs, snails, mushrooms, bacteria, and fungi decompose dead plants and animals, breaking them into smaller particles and releasing nutrients back into the soil. Compost is produced by biological decomposition under controlled conditions. Compost is made from garden waste and other materials high in carbon (leaves, straw) or nitrogen (grass clippings). When the organic materials are managed to ensure optimum moisture and airflow through the pile, the decomposers use the organic matter as an energy source and break it down into smaller compounds collectively called humus. The decomposition process produces heat which furthers additional decomposition. After the material is broken down, the compost can be added into the garden to improve soil structure and increase the nutrient content. Research has shown that compost applied on the surface of the garden can reduce weeds, but because of the many benefits compost imparts to soil, it is probably best to incorporate it into the soil. Apply a 1–3 inch layer of compost to the soil surface and mix it to a depth of 6–8 inches. Compost can also be used in potting media mixes at a rate of one part compost to 3 or 4 parts of other media ingredients.

Composting is easy and affordable in the presence of readily available raw materials. It also helps to reduce waste by making use of leaves, grass clippings, and other plant refuse. Florida is one of several states that have banned yard waste from landfills.

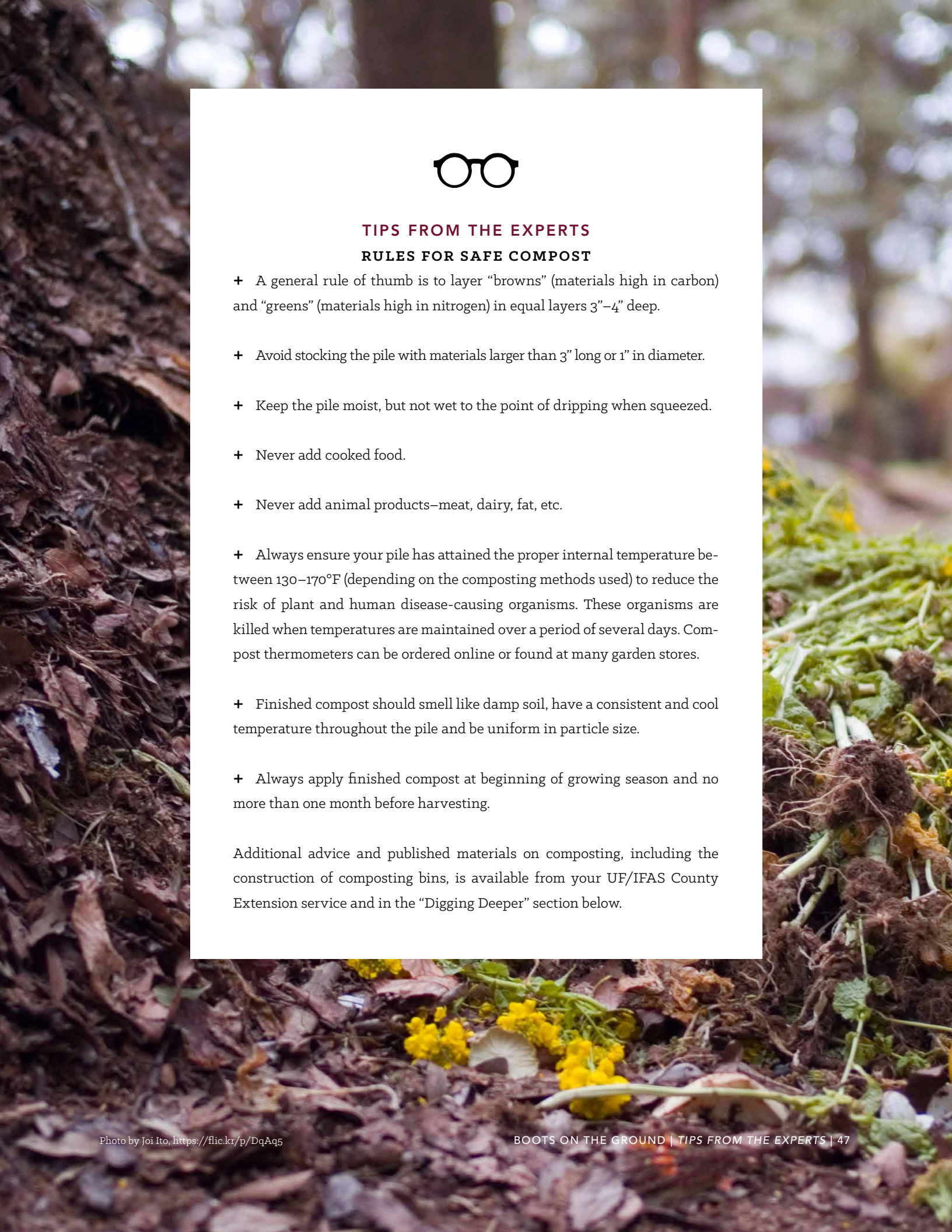
If you choose to compost, it's important to do it properly to reduce odor, to avoid attracting rodents and other scavenging animals, and to ensure food safety. Compost can be made in freestanding piles (between 3 and five feet, cubed) or contained in bins that allow for proper air movement.

Photo by Duncan Kinney, https://flic.kr/p/bS5Wpr

VERMICOMPOSTING | Vermicomposting is the process of using worms and microorganisms to break down paper and vegetable scraps into rich compost. One pound of worms can turn 65 pounds of trash into vermicompost in 110 days. In a school setting, vermicomposting can set the stage for a variety of fun, interdisciplinary activities. Worms are easy to care for, produce no offensive odors, and worm castings can be used to improve the fertility and water retention of soil or potting media in your garden. Apply vermicompost at similar rates to field soil or containers as compost (above). Information on how to build an inexpensive worm bin that will produce compost for your garden can be obtained from your local UF/IFAS County Extension agent or found in the "Digging Deeper" section below.

TRELLISING & OTHER PLANT SUPPORTS

Many plants require support in order to grow in a healthy and productive manner. Trellises can be built out of simple materials like bamboo poles, wood, and string. More information on plant support can be found in "Digging Deeper".



TIPS FROM THE EXPERTS

RULES FOR SAFE COMPOST

+ A general rule of thumb is to layer "browns" (materials high in carbon) and "greens" (materials high in nitrogen) in equal layers 3"–4" deep.

+ Avoid stocking the pile with materials larger than 3" long or 1" in diameter.

+ Keep the pile moist, but not wet to the point of dripping when squeezed.

+ Never add cooked food.

+ Never add animal products–meat, dairy, fat, etc.

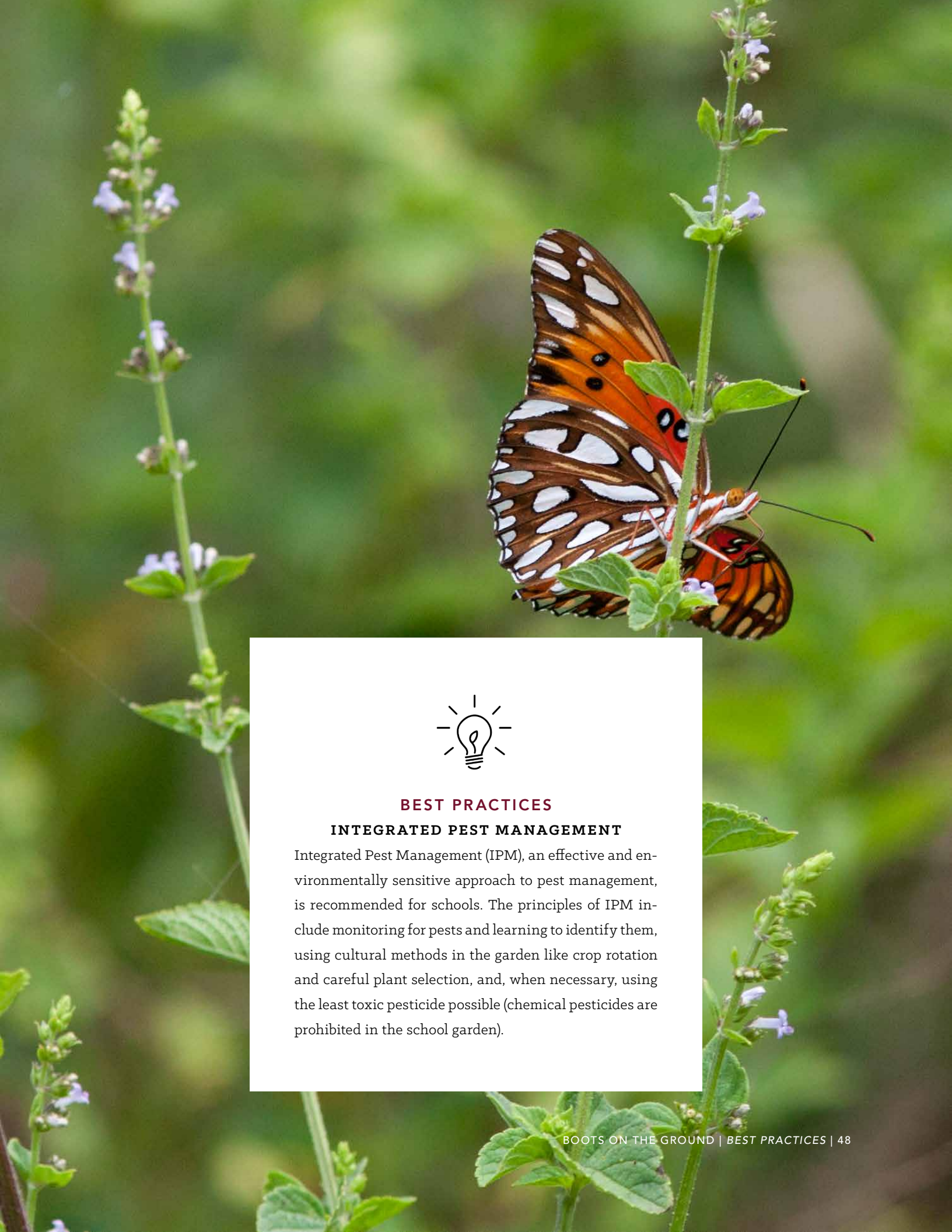
+ Always ensure your pile has attained the proper internal temperature between 130–170°F (depending on the composting methods used) to reduce the risk of plant and human disease-causing organisms. These organisms are killed when temperatures are maintained over a period of several days. Compost thermometers can be ordered online or found at many garden stores.

+ Finished compost should smell like damp soil, have a consistent and cool temperature throughout the pile and be uniform in particle size.

+ Always apply finished compost at beginning of growing season and no more than one month before harvesting.

Additional advice and published materials on composting, including the construction of composting bins, is available from your UF/IFAS County Extension service and in the "Digging Deeper" section below.

Photo by Joi Ito, https://flic.kr/p/DqAq5



BEST PRACTICES

INTEGRATED PEST MANAGEMENT

Integrated Pest Management (IPM), an effective and environmentally sensitive approach to pest management, is recommended for schools. The principles of IPM include monitoring for pests and learning to identify them, using cultural methods in the garden like crop rotation and careful plant selection, and, when necessary, using the least toxic pesticide possible (chemical pesticides are prohibited in the school garden).

DIGGING DEEPER

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FROST PROTECTION

For schools in Central and North Florida, you are likely to contend with frost and below-freezing temperatures. Planting crops that are cold-hardy in the fall is wise and will usually alleviate the need for protection as long as the temperature does not stay below freezing for more than a few hours. For other plants, and for tender spring plants that are threatened by a late frost, protection must be considered. In most cases, the best option is frost cloth. This keeps the plants protected from the cool temperatures while allowing air circulation around the plants. Since most cloth allows a degree of sunlight through, plants can continue photosynthesis and the cloth can be left on for 2–3 days if needed. More on using cover cloth to protect plants from freezing weather can be found in this helpful guide from UF/IFAS Polk County Extension in the "Digging Deeper" section.

Photo by Scott Smith Photographics

Photo by Marie Richie, https://flic.kr/p/2d2Vz

MANAGING PESTS & DISEASE

When it comes to keeping your garden healthy, an ounce of prevention is worth a pound of cure. Good cultural practices from the outset, as described in previous sections–observing planting dates, amending the soil, having a crop rotation plan, using mulch, and providing appropriate irrigation–will give your plants the best opportunity to thrive. The Florida Vegetable Gardening Guide in the Appendix provides an extensive list of practical approaches to controlling pests that do not include synthetic pesticides, including a table that provides a list of pesticides with formulations that are approved by the United States Department of Agriculture's National Organic Program. These products are generally available at national retail outlets and are deemed to have minimal risk to human and animal health by the Environmental Protection Agency. According to the USDA, no synthetic pesticides should be used in school gardens. Many schools have banned the use of any and all pesticides on school grounds, unless applied by a licensed pesticide applicator when students are absent from school grounds.

IDENTIFYING & MANAGING INSECT PROBLEMS IN THE GARDEN | A healthy garden is home to a number of insects, the great majority of which will not harm your plants. Even when potentially harmful bugs are present, they are not necessarily a threat to your garden. Healthy, well-established plants, like healthy human beings, can manage some stress and damage and still perform well overall.

Students can help scout the garden at least twice a week to look for possible damage to plants. Learning to identify insects and other crawling creatures in the garden is a fun scientific pursuit. There are a number of resources online, in the bookstore, and in the library that can help you identify common garden pests as well as beneficial insects. Students often need to be reminded not to jump to conclusions about bugs. Many pests have natural predators and if you take away the pest, you will never get to see the beneficial predator in action. Below-ground fauna is present too, and some of the biggest threats to a healthy garden in Florida are nematodes. Nematodes cannot be seen with the naked eye. Some signs of nematodes are stunted roots, or galls, on roots that do not easily fall off when rubbed. Plants with nematode damage will often have yellow leaves and not reach expected size. A healthy garden has a diversity of organisms all contributing something positive toward a stable ecology. Students, volunteers, and teachers will benefit from getting to know the garden's inhabitants and their roles as predators, pollinators, decomposers, and yes, the occasional pest.

BIG PESTS | Deer, rabbits, groundhogs, and other four-legged pests can devastate vegetable gardens. Birds, squirrels, mice, and raccoons can also become troublesome pests and can leave droppings and waste behind that can become contaminants. Do not feed wildlife near your garden, and if possible, secure permission, funding, and assistance to erect a fence with a gate. If deer are a problem, the fence needs to be 8 feet tall. If deer are not a problem, a 4-foot-high fence will suffice. Many types of woven wire and vinyl netting fencing materials are available. Bird netting is a soft fine mesh netting often used to protect tender fruit such as blueberries and strawberries from birds and other small animals. Bird neetting can be left on until the fruit is harvested.

DISEASE DIAGNOSIS & TREATMENT | Plant disease, like insect problems, can also be greatly abated by using sound gardening practices from the outset. Choosing healthy transplants, ensuring there will be adequate space between plants at maturity and watering in the morning are additional measures to take. Disease-resistant varieties have genetic characteristics that allow them to tolerate biological disease-causing organisms and are particularly important to use in our warm, humid climate. Diseases can also be abiotic (not biological in origin), but caused by a nutrient deficiency or some other environmental imbalance.

If you notice signs of plant disease, yellowing or curling leaves, sudden wilting, spots on the leaves or fruit, or flower or fruit drop, remove the affected part, if possible, to help keep it from spreading. Research with your students the possible diagnosis and its treatment. There are a number of identification guides under "resources" in this section. If you run into problems, your UF/IFAS County Extension agent will be happy to help.

DIGGING DEEPER

+ *Ayre, L. (2012). "Common plant diseases." Vegetable Gardening* http://www.vegetable-gardening-with-lorraine.com/common-plant-diseases.html
+ *"Helpful, Harmful, and Harmless"* insect flash cards. UF/IFAS Bookstore. http://ifasbooks.ifas.ufl.edu/p-153-helpful-harmful-harmless.aspx
+ *Integrated pest management (IPM) in schools.* (2013). US Environmental Protection Agency. http://www.epa.gov/pesticides/ipm/
+ *National school IPM information source.* (2013). UF/IFAS Extension. http://schoolipm.ifas.ufl.edu/INDEX.html
+ *Plant Pathology (mg).* (2013). UF/IFAS Extension. http://edis.ifas.ufl.edu/topic_mg_plant_pathology
+ Smith, H., and Capinera, J., (2000). *Natural enemies and biological control.* UF/IFAS Extension. http://edis.ifas.ufl.edu/in120
+ *"Managing Pests of the Vegetable Garden."* (2013). UF/IFAS Extension. http://training.ifas.ufl.edu/VegetableGardening/Pests/index.htm#
+ Webb, S., and Johnson, F., (1990). *Insect management in the home garden.* UF/IFAS Extension. http://edis.ifas.ufl.edu/vh036

GIVING THE GARDEN A BREAK

WINTER HOLIDAYS & LONG WEEKENDS

Be sure to have a plan for managing your school garden during the winter break or long weekends. Otherwise, it would be a good idea to remove any spent plants before leaving or cover with frost cloth if freezing weather is likely.

PUTTING THE GARDEN TO BED

SUMMER VACATION

Most, if not all, of the plants that were thriving during the spring will be approaching the end of their lifespan as summer vacation draws near. These should be removed and added to the compost pile. To avoid returning to a tangle of weeds in the fall, covering your garden should be the last big chore before beginning summer break. There are several options:

MULCHING | Cover the garden with a blanket of weed cloth, cardboard, or newspaper and then cover with 3–5 inches of leaves. The heat and rain will break these materials down quickly. By fall you should have a bed nourished with extra organic material ready to plant in with minimal weeding.

COVER CROPS | Cover crops are planted to provide some ecological benefit to the garden. Summer is a great time to plant cover crops.

+ Cut & Carry Cover crops can be planted at the end of the school year and allowed to grow to maturity and die in place. In the fall, if the cover crop plant material will be difficult to incorporate into the soil with the tools you have, it can be cut at the base and removed from the garden while fruits and vegetables are planted and then returned to the soil to be used as surface mulch for weed suppression. This method is often called "cut and carry."

+ Green Manure When cover crops are incorporated into the ground while they are still green and actively growing, they are called green manures. These plants actually add nutrients to the soil while crowding out weeds and helping control pests and disease. Plants like cowpea, sunflower, soybean, and sesame are all appropriate crops that require little care, although they may need some water if there is a drought. Simply remove all vegetation from your garden at the end of the school year, scatter the cover crop seed widely, and cover with one inch of finished compost or straw. To avoid adding unwanted seed back into the garden, harvest the seed before terminating the cover crop or terminate the crop before the seeds mature. Check the "days till harvest" to ensure proper timing. Mowing them close to the ground and then letting them lie a few days will make turning them into the soil a little easier. You may need to turn the soil more than once to ensure adequate decomposition before your beds are ready for planting.

+ Summer Vegetables Planting heat-loving plants for a late summer harvest is another possibility, if there is someone who can occasionally supervise the garden. Vegetables that will grow over the summer will be ready for harvest when the students return. Sweet potatoes make a lovely groundcover that will shade out many weeds and a few Seminole pumpkin or watermelon plants can cover quite a large garden. If all goes well, you can celebrate the return to school with pumpkin and/or sweet potato pie!

SOLARIZATION | For severe infestations of soil-borne diseases or nematodes in raised beds or in-ground gardens, solarization may help. Covering the soil with clear plastic during the hot summer will allow sunlight to pass through and heat up the soil to a temperature lethal to many weeds, nematodes, diseases, and insects. When you return in the fall, you can roll up the plastic, add mulch, and plant. This should only be used if the problem is extreme as it will also kill the "good bugs."

+ Black Plastic If there have been no soil-borne diseases or nematodes, covering the garden with black plastic will keep down weeds during the summer.

BEST PRACTICES

CHECKLIST | Soil Solarization

+ *Plan to solarize during the hottest months of the year - June, July, and August.*

+ *Clear the area of weeds as well as sticks, old roots, and stones that may penetrate the plastic.*

+ *Irrigate the day before so the soil is damp, which will conduct more heat, but not muddy enough to smudge the clear plastic.*

+ *Use a sheet of clear, heavy mil plastic slightly larger than the area to be treated. Select a commercial grade plastic designed for agricultural use. Other plastic will likely deteriorate quickly in the sun and heat.*

+ *Soil must remain tightly sealed for at least six weeks. Stretch the plastic over the area tightly and completely bury the edges so heat cannot escape.*

DIGGING DEEPER

+ McSorley, R., and Gill, H., (2010). *Introduction to soil solarization.* UF/IFAS Extension. http://edis.ifas.ufl.edu/in856

HARVESTING

The best part of growing a school garden is the joy of harvesting the fruits of your labor! Knowing when and how to harvest your produce for maximum quality will ensure that you and your students will have a great experience. This phase of the gardening experience will also provide a wonderful opportunity for experiential learning. There are many resources to help you develop a curriculum that meets your needs and offers fun, interactive activities to integrate academics and nutrition from the garden into your classroom.

WHEN TO HARVEST

It is important to consider the amount of time you will need to grow and harvest the bounty of your garden! You want to choose plants that have "days to harvest" that match your timeline for the classroom so that you can be sure your students will get to experience as much of the plant's lifecycle as possible The approximate planting and harvesting dates for many common vegetables for North, Central and South Florida can be found in the Appendix.

If you are new to vegetable gardening, it may not be obvious what vegetables look like when they are ready for harvest. Using the guide mentioned above is a great start, but that can all change based on the weather: more heat or cold, sun or shade, and rain or drought. Check seed packets for additional information as there are many differences based on varieties. The Appendix has more information on signs of readiness to harvest.

HARVEST SAFETY

A few simple steps will ensure you have a fun, safe harvest to enjoy with your class. Before and during harvest use clean and sanitized tools, gloves, harvest containers, and work surfaces. Be aware of what hands and tools have touched before moving to another task that involves edible plants, especially picking. Clean and sanitize tools and containers in an area well separated from your vegetable garden.

+ Diluted bleach (1 teaspoon in 4 cups water) or pure white vinegar are safe for sanitizing tools and containers.

+ Always use clean and sanitized containers that are made from materials designed specifically to safely hold food for harvesting. Examples include paper grocery bags, 5-gallon food-grade buckets (use only new food-grade buckets or food-grade buckets that held only food items, such as pickles), colanders or plastic kitchen bowls. Never use plastic garbage bags, trash cans, or any containers that originally held chemicals such as household cleaners or pesticides.

+ Wash hands before and after picking produce. If using gloves, be sure they are cleaned and stored properly.

+ Brush, shake, or rub off any excess garden soil or debris before putting the produce into the harvest container or bringing produce into the kitchen. It is not recommended to wash fruits and vegetables before refrigerating, but to wash them immediately before eating or preparing for cooking. Refrigerating fruits and vegetables with moisture from washing can encourage microbial growth.

+ When washing produce, use cool, running, potable water. Produce with thick skins, like potatoes, can be scrubbed with a vegetable brush to remove excess dirt and bacteria.

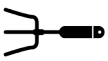
+ Fruits and vegetables stored at room temperature (like onions, potatoes) should be kept in a cool, dry, pest-free, well-ventilated area separate from chemicals.

+ Handle produce gently to avoid bruising and always cut away damaged parts of fruits and vegetables before eating or preparing. Throw moldy produce away. Always cover and refrigerate cut fruit and vegetables when preparing them in advance.

+ Do not serve cut fruit and vegetables if they have been held for longer than 2 hours at room temperature or longer than 1 hour at temperatures above 90°F (32°C).

+ If possible do not mix root crops with above ground crops; keep leafy greens, especially those eaten raw, separate from other vegetables.

DIGGING DEEPER

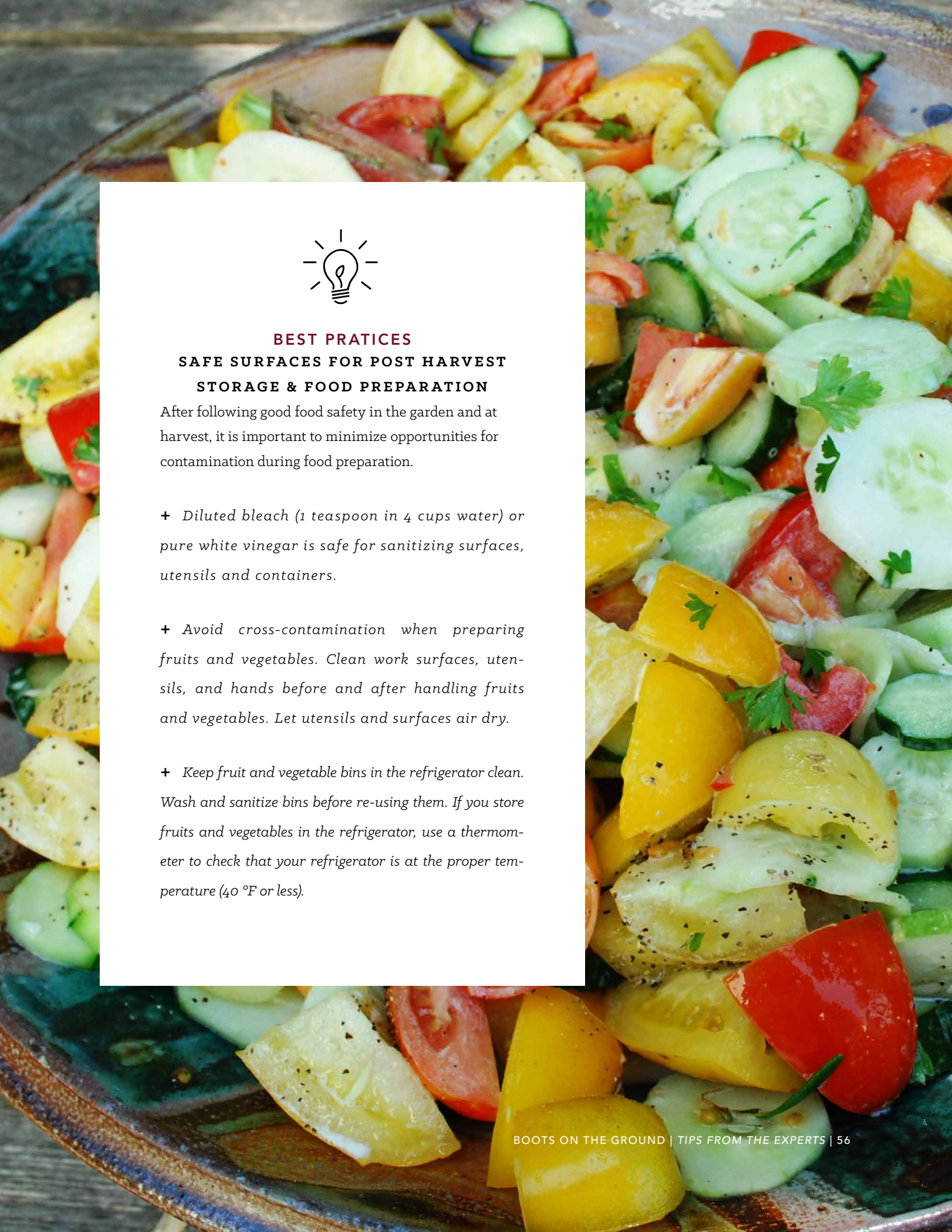


+ Chaifetz, A., Driscoll, L., Gunter, C., Ducharme, D., and Chapman, B., (n.d.). *Food safety for school and community gardens.* NC State University. http://growingsafergardens.files.wordpress.com/2012/10/foodsafetywebcurriculum-10-24-12.pdf

+ *Farm to school: FAQs - food safety.* (2013). US Department of Agriculture. http://www.fns.usda.gov/farmtoschool/faqs-food-safety

+ *Food safety tips for school gardens.* (2009). US Department of Agriculture. http://nfsmi.org/documentlibraryfiles/PDF/20110822025700.pdf

+ Williams, L., (2008). *Harvesting vegetables.* UF/IFAS Extension. http://okaloosa.ifas.ufl.edu/harvesting_vegetables.shtml



BEST PRATICES

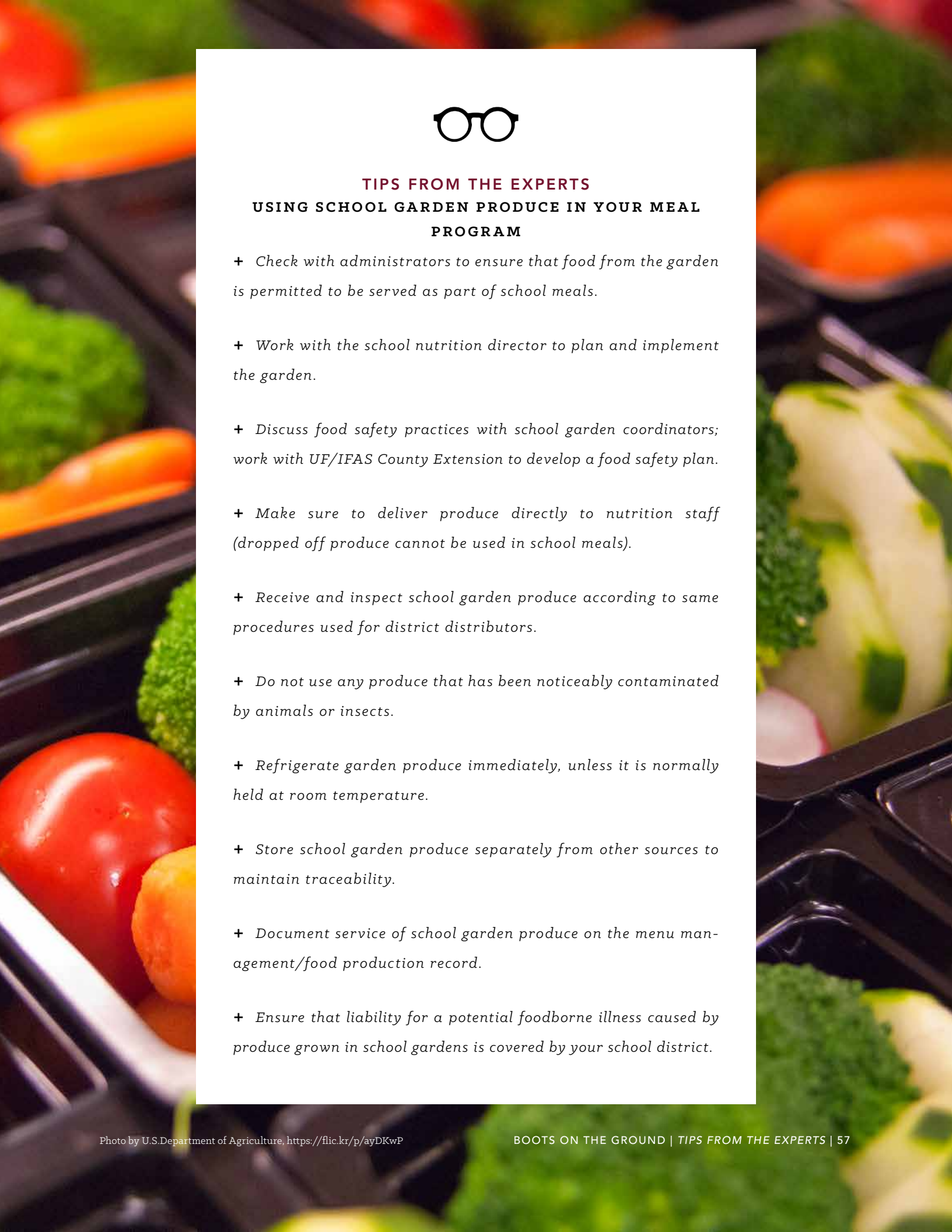
SAFE SURFACES FOR POST HARVEST STORAGE & FOOD PREPARATION

After following good food safety in the garden and at harvest, it is important to minimize opportunities for contamination during food preparation.

+ *Diluted bleach (1 teaspoon in 4 cups water) or pure white vinegar is safe for sanitizing surfaces, utensils and containers.*

+ *Avoid cross-contamination when preparing fruits and vegetables. Clean work surfaces, utensils, and hands before and after handling fruits and vegetables. Let utensils and surfaces air dry.*

+ *Keep fruit and vegetable bins in the refrigerator clean. Wash and sanitize bins before re-using them. If you store fruits and vegetables in the refrigerator, use a thermometer to check that your refrigerator is at the proper temperature (40 °F or less).*



TIPS FROM THE EXPERTS

USING SCHOOL GARDEN PRODUCE IN YOUR MEAL PROGRAM

+ *Check with administrators to ensure that food from the garden is permitted to be served as part of school meals.*

+ *Work with the school nutrition director to plan and implement the garden.*

+ *Discuss food safety practices with school garden coordinators; work with UF/IFAS County Extension to develop a food safety plan.*

+ *Make sure to deliver produce directly to nutrition staff (dropped off produce cannot be used in school meals).*

+ *Receive and inspect school garden produce according to same procedures used for district distributors.*

+ *Do not use any produce that has been noticeably contaminated by animals or insects.*

+ *Refrigerate garden produce immediately, unless it is normally held at room temperature.*

+ *Store school garden produce separately from other sources to maintain traceability.*

+ *Document service of school garden produce on the menu management/food production record.*

+ *Ensure that liability for a potential foodborne illness caused by produce grown in school gardens is covered by your school district.*

Photo by U.S.Department of Agriculture, https://flic.kr/p/ayDKwP

SUSTAINING *the* GARDEN

Your garden is growing and the school community is enjoying the fruits of your labor. The science curriculum is coming to life as the cycle from seed to seed manifests itself just outside the classroom door. Take some time to celebrate with the students and the team that helped to make this happen!

It's also time to begin planning how to keep the garden vision alive and thriving over time. Just as you made a plan for garden maintenance, a schedule needs to be created for activities that will help sustain your garden. For the garden to continue into the future, it's important that it remain connected with the curriculum, supported by the administration, attractive to volunteers, and funded for the long haul. This section offers ideas for sustaining your garden as an inspirational and exciting place for learning to happen for many seasons to come.

STRENGTHENING THE CONNECTION
IN THE SCHOOL

One way to keep your garden relevant is to find ways to strengthen its connection to school-wide learning. Inviting additional classroom teachers to participate in the garden is a good step. Another possibility is to reach out to "special area" teachers who work with students in art, music, physical education or other disciplines to use the garden as an outdoor classroom. After-school programs may benefit from time in the garden as well. The more connected the garden is to the overall work of the school and its staff, the more enthusiasm for its continued existence will be generated.

In addition to enhancing learning, the garden can have some very practical connections to the well-being of the students through nutrition. Research has shown that students are more likely to choose vegetables when they have had a hand in growing them. The garden can provide healthy snacks for classroom celebrations and can even become part of the school's lunch program. As the connection to both the learning environment and the health of the students is made, administrators will become even more supportive of the garden and what it brings to the school.

IN THE COMMUNITY

Your garden team and supporters will be as vital to the long term success of the garden as they were to its inception. It is important to keep them informed of both the needs and successes of the garden over time. Establishing a routine for communication will help inspire their continued involvement.

One way to accomplish this is to create a garden newsletter and distribute it on a regular basis to inform stakeholders of upcoming events and additions to the garden. Include photos of the students (with permissions on file as required by your school board) and volunteers in the garden with stories and/or pictures created by the students. Other possibilities include:

+ *Share articles with PTA for their newsletter.*
+ *Send gardening info home with students.*
+ *Create a garden website or blog and update it regularly.*
+ *Hold regular community workdays to offer opportunities for hands-on involvement.*
+ *Have an end-of-the-season celebration and invite volunteers and supporters. Consider giving awards or small volunteer gifts.*
+ *Submit articles and photos to the local newspaper.*
+ *Keep the local UF/IFAS County Extension office informed of your efforts and offer garden tours for other schools considering creating their own school garden.*

FINDING FUNDS

Actively promoting your garden in the community is a great step to finding funds. Publicizing additions and expansions to your garden is helpful as well, since it's easier to find funds for new projects over ones already in existence. The resources for initial funding found in the Getting Started section can also be a source of continued funding. In addition, your established garden can generate its own funds by providing excess produce for sale to individuals and as ingredients for value-added products. The garden can also become the site for its own annual fundraiser.

BECOME A LITTLE FARM

If your garden is large enough, you can generate some income for materials by offering the produce for sale to school staff. The students can operate a "store" or utilize a Community Supported Agriculture (CSA) model. The store offers opportunities for students to show off the fruits of their labor and also get valuable experience weighing, counting, and accounting. Selling shares through a CSA project is a way to generate funds at the beginning of the growing season. Buyers pay up front for a share of the projected weekly harvest. The process of packaging and selling the produce each week builds community and garden pride at the same time while also generating funds for future gardening activity and more produce.

Other "value-added" garden products can be sold as well, from sachets created from fragrant herbs to potted transplants. These products could be sold in the garden store, at special times during the year, or at an annual fundraising event.

CREATE A COMMUNITY FUNDRAISING EVENT

A fundraising event is a good project to develop with your garden team, with support from school administrators. Planned during peak times of garden harvest, a fundraiser held on location can be a good opportunity for students to show off the results of their hard work. Garden tours can be given, questions answered, and future needs expressed. Participants can be treated to refreshments featuring some of the garden produce and have the opportunity to donate funds, time, or garden supplies to help the garden continue. Garden products can also be sold at the fundraiser. A community-wide celebration of the garden can produce great publicity, nurture enthusiasm, and inspire giving that will allow it to continue to enhance the school and the community. The garden itself is the best evidence that it's worthy of long-term support.

COMMUNITY VOLUNTEERS

There are many people in the community who have a strong interest in the well-being of students, even if they don't have direct gardening experience.*

A FEW TO GET YOU STARTED | Local News Anchors | Chefs | Emergency Medical Technicians | Armed Services Members| Firemen | Police Officers | Scouting Groups | Hospital Staff | Alumni Groups | Local University Professionals

EVALUATION

In the beginning, you developed a list of goals for the garden program. Evaluating how those goals have been met and creating new goals will keep your garden program relevant. Pre-tests and post-tests for knowledge gained can be good indicators of how well your goals have been met. If, for instance, one of your goals is to raise the student knowledge of plant science, you can formulate questions to indicate what they knew at the beginning of the garden season and show what they learned at the end. Similar tests can be given to determine their familiarity with or preference for certain vegetables if your goal is nutrition education or impacting student choices. School evaluations have also included recording the amounts of fruits and vegetables left on lunchroom plates before and after the gardening experience to assess the effect the school garden has on choice and consumption. Curricula often have clearly defined learning outcomes that can serve as the basis for pre-test and post-test questions. There are some very helpful evaluation tools in the "Digging Deeper" section below.

** Most community volunteers will need a background check to be able to work in schools, and this may take a few weeks to clear.*

GARDEN SPOTLIGHT | OAKCREST ELEMENTARY

Pensacola, FL

The more the school garden is integrated into the life of the school, the more sustainable the garden. The gardens at Oakcrest have been successfully incorporated into almost every aspect of the school culture and curricula. Every student (around 650 in 2013–14) has the opportunity to participate in garden activities, and the garden is supported by not only the faculty and administration, but also the parents and the community. They have several community partners that helped with financial support, building materials, and manpower. Parents and volunteers take an active interest in this garden because of the excitement generated by the student body.

John Herber, 5th grade science teacher, coordinates the maintenance and use of the garden so that every student can be involved. Teachers at Oakcrest Elementary use the garden to teach science, math, economics, and nutrition.

In addition to its use throughout the academic curriculum, the students enjoy preparing and eating food grown in the garden in several ways. Students in the Culinary Club learn how to clean and prepare ingredients, follow recipes, and make healthier food choices. The cafeteria staff have welcomed the produce that the kids have grown and incorporated it into their school meals. They have found that the students are excited to try anything that they have grown, and that this has increased the amount of fresh produce that they order for school meals.

Oakcrest also participates in a backpack program, allowing students to take backpacks filled with food home with them over the weekends. Many of these students are receiving the bulk of their caloric intake from school meals, and without that meal, they may go hungry. The school garden helps supplement these backpacks with fresh and nutritious foods for families that wouldn't otherwise have access.

The garden is also partially funded by the sale of its produce. Loofahs can be seen growing on the fences surrounding the garden and, after maturing and dried, the "sponges" are filled with soap, then packaged and sold to teachers and parents. Here, too, the students are learning from their garden as they calculate cost of materials and determine profit.

TO FIND & KEEP VOLUNTEERS

Retaining volunteers and recruiting new ones is vital to the long-term well-being of your garden. One person really can't do it alone over the long-term.

As discussed in "Getting Started," sources for volunteers include parents and neighbors, as well as other local supporters with a commitment to fresh, nutritious food. Some volunteers may only be available for a single event. Local clubs or organizations wanting service hours are great resources for big jobs like installation, expanding your garden, or preparing it for a summer rest. Others may be recruited for a regular short-term commitment–a month, or a semester. There are others you may be able to keep season to season. These volunteers will grow in experience alongside the garden and become invaluable over time. It's important to nurture all different types of volunteers. Recruiting a volunteer who will work with and organize volunteers should be a top priority.

Providing an orientation for volunteers is important to both their enjoyment of their position and to their success in the garden. First, you will need to orient them with the garden program, the students, and the school. Remind them of their importance to the garden and to the students they will work with. They also need to be informed of school policy regarding volunteer screening. Be prepared to provide important information in writing.

Garden training is an important aspect of orientation as well. Get to know your volunteers and their level of garden experience. Comprehensive training on both their responsibilities working with students and the basics of working with plants is important. Offering "hands-on" experience with the basics of gardening, sowing seeds, planting transplants, watering, weeding, etc., will be helpful to them and can function as a garden workday as well. Feeling confident about the type of work required by them and well-informed of their importance to the program will help get volunteers off to a good start. Your UF/IFAS County Extension office offers a host of educational programs relevant to your volunteers, so consider partnering with UF/IFAS Extension to deliver a gardening training to your volunteers.

Your regular garden volunteers will become an important part of your team. Inviting them to planning sessions will help them feel included and will offer helpful input for the team. Appreciating them regularly, verbally and with notes, will help them realize how important they are to the team. A celebration at the end of the year to show your appreciation, possibly in conjunction with a fundraiser, would be a nice way to encourage them as well.

DIGGING DEEPER

+ *Cottage food legislation signed into law.* (2013). Florida Department of Agriculture and Consumer Services. http://www.freshfromflorida.com/content/download/10223/137606/CottageFoodAdvisoryWithFormNumber.pdf

+ Swisher, M., Koenig, R., Gove, J., and Sterns, J., (2003) UF/IFAS Extension. *What is community supported agriculture.* http://edis.ifas.ufl.edu/cd019

+ Terry, B., Pracht, D., and Wiggins, L., (2010). *The volunteer life cycle: A key to 4-h volunteer involvement.* UF/IFAS Extension. http://edis.ifas.ufl.edu/4h300

+ *Developing an effective evaluation plan.* (2011). Centers for Disease Control and Prevention. http://www.cdc.gov/obesity/downloads/cdc-evaluation-workbook-508.pdf

+ *Evaluation toolkit.* (2013). Cornell University. http://blogs.cornell.edu/garden/grow-your-program/evaluation-toolkit/

+ *Resources for farm to school evaluation tools.* (2013). US Department of Agriculture. http://www.fns.usda.gov/farmtoschool/resources-farm-school-evaluation-tools

+ *The 2002 user-friendly handbook for project evaluation.* (2002). National Science Foundation. http://www.nsf.gov/pubs/2002/nsf02057/

Photo by Scott Smith Photographics

EXPANDING *your* GARDEN

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While it is wise to start simple and small, you may want to expand your garden as you grow in experience. Adding pollinator-attracting plants and perennial food crops are two interesting ways to add beauty and depth to your vegetable garden, as well as a number of new learning experiences for your students.

GARDENING FOR NATIVE POLLINATORS

A pollinator is an animal or insect that transfers pollen from flower to flower. Butterflies, bees, beetles, flies, tiny wasps, hummingbirds and even some species of bat are all pollinators. Plants, which are rooted to the ground and can't go look for a mate like animals do, depend on pollinators to unwittingly transfer pollen from the male anther of one flower to the female stigma of another. Successful pollination results in the production of seeds and fruit – plant reproduction. Pollinators are vital to food production in your garden and in the world over.

In addition to their agricultural value, pollinators are also essential components in other plant systems. In the wild, pollinators increase biodiversity and create more food for wildlife. The presence of pollinators is as important as water, sun, and soil to the success of many of the world's flowering plants.

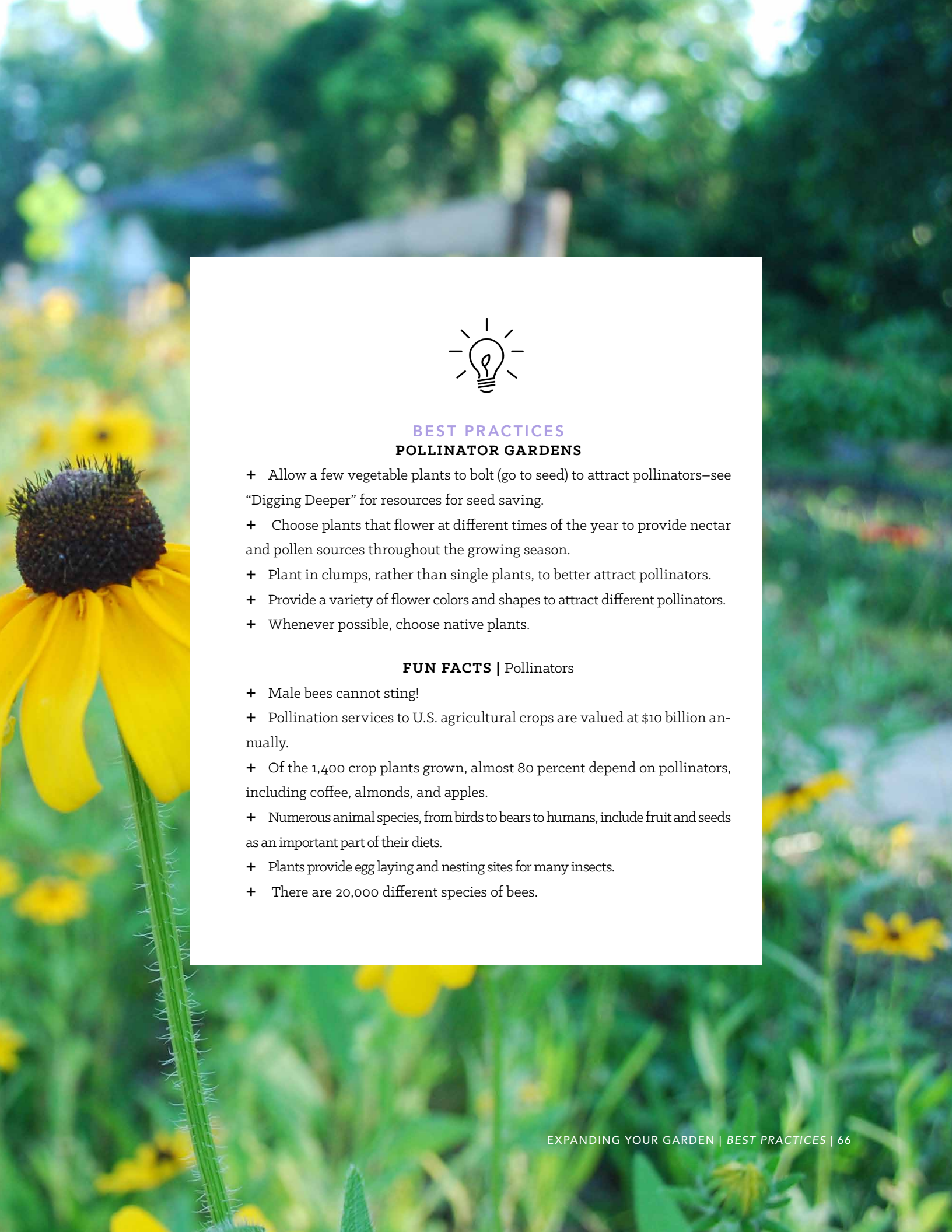
During the last century, pollinator species have been on the decline. Loss of habitat, exotic parasites, and overuse and misuse of pesticides have contributed to the loss. By adding pollinator-attracting plants to the school garden, students can provide an oasis for pollinators while investigating the fascinating process of pollination – learning about both the animals that visit the garden and their showy flower partners. While this section will focus on butterflies and bees, other pollinators will be attracted to many of the same plants.

BUTTERFLIES

Florida is home to 180 native butterfly species, boasting the highest number east of the Mississippi River, 40 of which are either unique to the state or occur mainly within its boundaries. Attracting butterflies to your school garden can aid in pollination and provide opportunities to learn about these fascinating creatures as they progress through their life stages from egg to larvae (caterpillar) to pupa (chrysalis) to adult butterflies. With the right plants, your Florida school garden is almost bound to attract butterflies.

A butterfly garden is most successful when it provides food for both adult butterflies and their larvae (caterpillars). Most adult butterflies feed on flower nectar and will be attracted to a wide variety of different flowers. Caterpillars, though, rely on specific plants called host plants for food and these are much more limited. Host plants may also provide shelter and camouflage, as well as chemicals used for protection, courtship, and reproduction. It is not necessary to include larval host plants to attract butterflies, but adults tend to stay fairly close to the areas where their larval food plants can be found. If you do use larval host plants, remember that, unlike other plants in your garden, these will be eaten by caterpillars if all goes well.

You can learn more about the butterflies that inhabit your area of the state, their food sources and larval plants in the UF/IFAS document, "Butterfly Gardening in Florida," found in the Appendix.

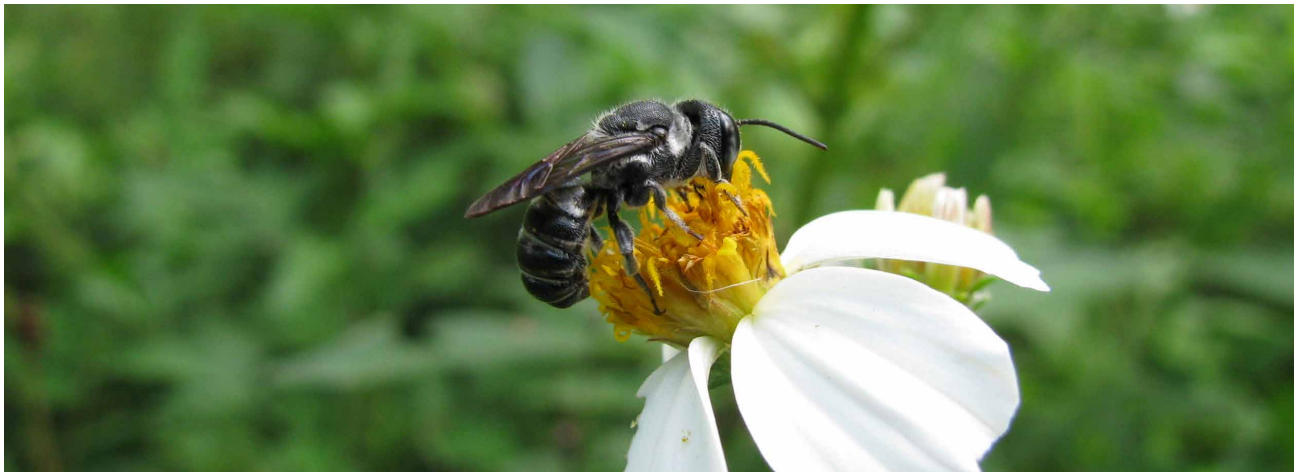


BEST PRACTICES
POLLINATOR GARDENS

+ Allow a few vegetable plants to bolt (go to seed) to attract pollinators–see "Digging Deeper" for resources for seed saving.
+ Choose plants that flower at different times of the year to provide nectar and pollen sources throughout the growing season.
+ Plant in clumps, rather than single plants, to better attract pollinators.
+ Provide a variety of flower colors and shapes to attract different pollinators.
+ Whenever possible, choose native plants.

FUN FACTS | Pollinators

+ Male bees cannot sting!
+ Pollination services to U.S. agricultural crops are valued at $10 billion annually.
+ Of the 1,400 crop plants grown, almost 80 percent depend on pollinators, including coffee, almonds, and apples.
+ Numerous animal species, from birds to bears to humans, include fruit and seeds as an important part of their diets.
+ Plants provide egg laying and nesting sites for many insects.
+ There are 20,000 different species of bees.



BEES

Bees are especially efficient pollinators, and there are many native species. There are approximately 4,000 native bee species in North America. In Florida, there are 6 families and 360 genera of native bees. Native bees are the most important pollinators of Florida native plants.

Bees are fun to observe. Most bees do not sting, and there is little chance of being stung if you move slowly and non-aggressively. Native bees, like other pollinators, prefer native plants. They will also be attracted to plants you may already have growing in your garden such as sunflowers, legumes (beans and peas), and mint. You can also attract a number of bees by simply allowing some of your vegetable plants to bolt, or go to seed. Leafy green plants like lettuce and those from the brassica family like broccoli, collards, and mustard greens will flower toward the end of the season and will eventually set seed in tiny pods. Allowing these plants to complete their life cycle will extend the availability of food for bees and other native pollinators beyond the typical season's length as well as allow your students to witness the plant's life cycle full circle.

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GROWING PERENNIAL FRUIT CROPS

Perennial fruit crops can be added to almost any school garden. They have many of the same requirements that annual vegetable plants do: 6–8 hours of sun, fertile soil, adequate water, etc. However, unlike annuals, which complete their life cycle in one season, perennial crops continue to grow year after year. Adding them to your garden creates a more permanent landscape element which also bears delicious fruit.

Perennial fruit crops also have some additional requirements. They usually grow much larger than annuals and need more space. They also require occasional pruning to optimize fruit production. Perennial fruit have temperature limits that are necessary to produce an abundant harvest. Some crops, like blueberries and peaches, require a certain number of hours of low temperatures. Other crops, like citrus, must be protected from the cold in order to produce harvestable fruit. With some planning, almost any school garden can include at least one perennial fruit crop.

If you have the good fortune to have plenty of sunny space in your school yard, you might consider designing an orchard into your overall plans. For schools that are more limited in space, fruit crops might replace landscape ornamentals as a hedge along a fence, or on a free-standing trellis or arbor. Many fruit crops can also be grown in containers.

The type of crop you can grow will also be limited by the climate in your region of the state. For fruit plants, there are two concerns with cold hardiness. The first is whether the plant will survive the winter. Florida falls into zones 8b–10b on the USDA Plant Hardiness Zone Map (see "Digging Deeper" section). While temperate-zone fruits, which are fairly cold-hardy when dormant, can survive North Florida winters, some tropical fruits cannot. Further south, subtropical and tropical fruit crops are divided by their cold tolerance.

On the other side of the coin, some fruit crops have a chilling requirement. They require exposure to cool temperatures during their dormant period in order to produce flowers and begin active growth again in the spring. It is important to choose the right type of fruit and the best variety for your particular region and climactic zone. You can learn more about which fruit plants will thrive in your region in the UF/IFAS document, "Dooryard Fruit Varieties" in the Appendix.

ORANGES, OF COURSE

The orange is synonymous with Florida. However, it is a subtropical fruit and most types are limited to areas that do not regularly experience frost. Pollination, spacing, and pest control are common issues. Also, before planting citrus, be sure to speak with your County Extension agent regarding citrus greening and other diseases that might restrict planting citrus in your area.

Gardens in Central Florida and South Florida can grow almost any type of orange. Growers in North Florida should choose cold-hardy types like Satsuma and Kumquat that can withstand the region's occasional cold snaps. Cold-hardy varieties should still be planted in a protected area, like the south side of a building, to ensure fruit production for years to come. Citrus can also be grown in pots in the northern part of the state and brought indoors during occasional freezes. You can learn more about growing fruit in containers in the IFAS/EDIS document: "Growing Fruit in Containers" in the Appendix. Almost any Florida school garden can grow some version of our state fruit.

Pollination, spacing and pest damage are other considerations to keep in mind when planning an addition of oranges to your garden. A few varieties (for example, mandarins) will produce very little fruit unless another tree is planted nearby to provide cross-pollination. It is also recommended that there be a minimum of 15 feet between trees as citrus trees grow rapidly when they are given good care. Septic tanks and drain fields should be avoided to prevent drains from being clogged by deep roots. Most varieties can be grown successfully without synthetic pesticides. The fruit may have blemishes on the outside, but it will still be juicy and sweet on the inside. These conditions can be met by many school gardens.

BLUEBERRIES

Blueberries are another good fruit crop to consider for your school garden. Regional climate, soil pH and pollination need to be considered in addition to the basic needs they share with other plants in your vegetable garden. South Florida may have a better climate for citrus, but Central and North Florida are just right for blueberry growing. There are two types of blueberries that grow well in our state, rabbiteye and southern highbush. However, only certain low-chill cultivars of each are adapted to Florida. Generally, rabbiteye blueberries grow best from Ocala north. The southern highbush cultivars that are commonly grown in Florida are better adapted to areas south of Ocala and north of Sebring. New cultivars developed by breeding programs often aim to extend the southern and northern most limits of production to expand commercial markets.

Another important factor to consider is that blueberries require acidic soil with a pH of 4.0–5.5. A soil test is vital, and your UF/IFAS County Extension agent can advise you on whether your soil will support blueberry plants, and what amendments might be necessary. In general, the more organic matter, the better. Peat moss and pine bark are commonly used to reduce soil pH and also increase organic matter as they break down. Peat and pine bark are also good growing mediums for growing blueberries in pots.

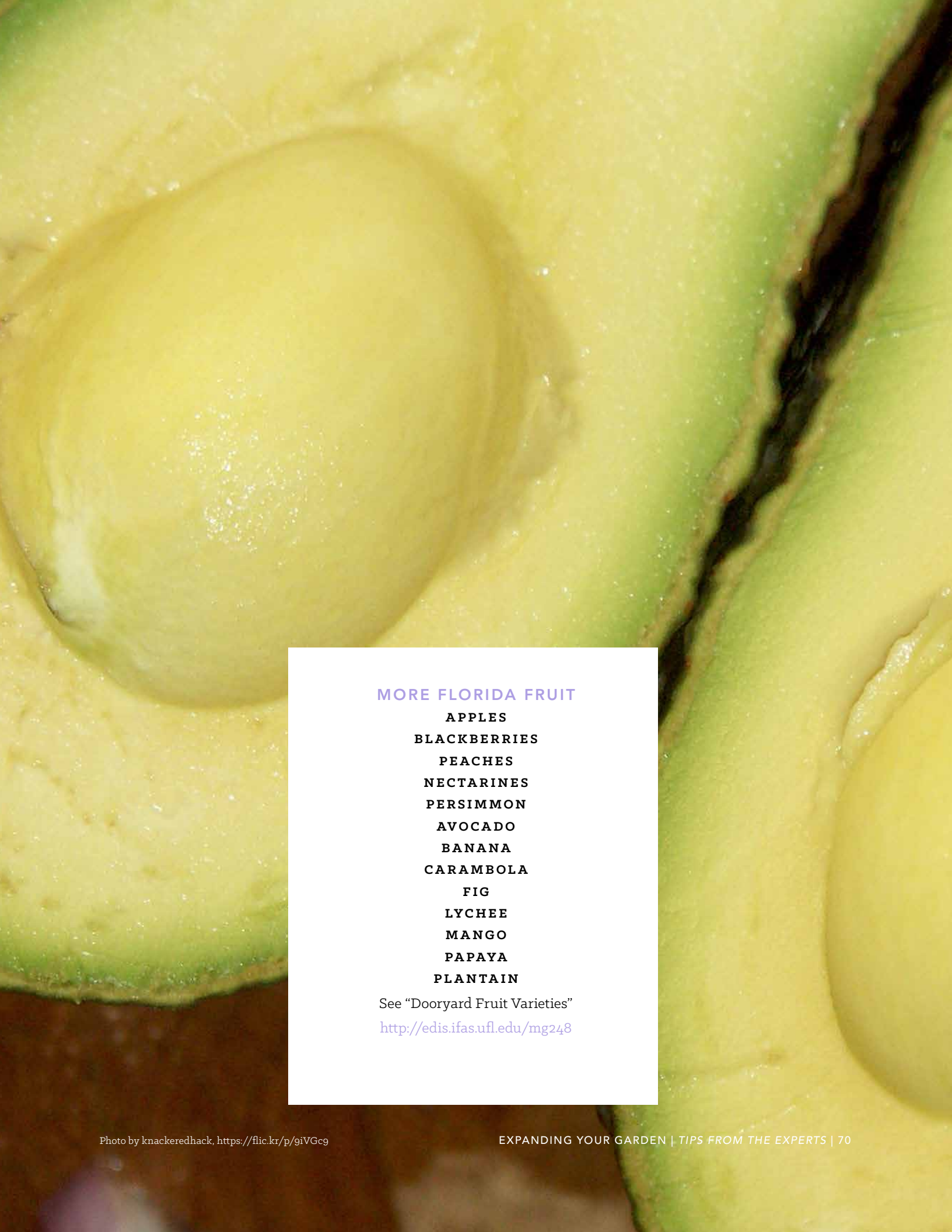
Space is an issue with this perennial as well, although the two different varieties have different requirements. A mature rabbiteye blueberry plant can reach up to 15 feet in height with canes sprouting over an area of 8–10 feet in diameter; southern highbush plants are somewhat smaller. Allow at least a 7' x 7' area for rabbiteyes and a 4' x 4' area for southern highbush. Plants may be set 3 feet apart (southern highbush) or 5 feet apart (rabbiteye) for a hedgerow effect.

Pollination is an important consideration. Rabbiteye requires cross-pollination to produce fruit, and southern highbush benefits from cross-pollination. To ensure cross-pollination, select at least two of cultivars of each type which flower at the same time (two or more rabbiteyes or two or more southern highbush), and plant them together. Encourage bees by ensuring other garden plants are in flower ahead of and during the early part of the perennial fruit season. A steady provision of flowers will provide a consistent food source for pollinators that will benefit all aspects of the garden. Growing several cultivars will also expand the harvest season. Many native Floridians remember picking blueberry relatives in the wild as children. Adding these hardy plants to your garden will allow another generation of Floridians to enjoy this tradition.

MUSCADINE GRAPES

Muscadine grapes can be grown in most areas of Florida, although most varieties do best in the central and northern parts of the state. The muscadine is native to the southeastern United States and was the first native grape species to be cultivated in North America. Muscadines are tolerant of insect and disease pests and can be grown in a wide range of soil conditions.

Muscadine grapes can be planted vineyard-style with traditional post-and-wire trellises. They can also be grown on an overhead arbor providing shade for classroom gatherings, or over an archway as an entrance to your garden. They are fast growers, and after only three years, a grape vine can easily cover a 6-foot by 15-foot horizontal area. Several cultivars could be planted together to prolong the ripening period and also to provide a variety of grape sizes, colors, and flavors.



MORE FLORIDA FRUIT

APPLES
BLACKBERRIES
PEACHES
NECTARINES
PERSIMMON
AVOCADO
BANANA
CARAMBOLA
FIG
LYCHEE
MANGO
PAPAYA
PLANTAIN

See "Dooryard Fruit Varieties"
http://edis.ifas.ufl.edu/mg248

Photo by knackeredhack, https://flic.kr/p/9iVGc9

SHITAKE MUSHROOMS

And now for something completely different! You can take your garden in a whole new direction by cultivating mushrooms. Shiitake mushrooms have been enjoyed for centuries in Asia. Growing mushrooms is a great opportunity for your students to learn more about fungi. They can also be grown in shadier areas of your garden. You can find more information on growing Shitake in the "Digging Deeper" section below. Ask your UF/IFAS County Extension agent for recommendations for your school garden.

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Photo by Marie Richie, https://flic.kr/p/69fdm

WIDENING THE CIRCLE

While there are many similarities between school gardens and community gardens, there are also a number of differences. Community gardens are places where families or individuals exchange volunteer time or money for the opportunity to enjoy the many rewards of gardening. They are places that only thrive when carefully coordinated and nurtured by all the gardeners, and often serve as resources for the entire community. When planned and managed properly, they can play a big role in neighborhood food security, open space, education, and recreation, and are a constructive use of vacant land.

While this guide may provide some of the technical garden details and information on maintenance of gardens that can be used regardless of the audience, there are a number of resources on the internet (See "Digging Deeper") that address the issues outlined above, and provide guidance for the development of successful community gardens.

Some important considerations that are unique to community gardens include:

+ City ordinances, land tenure, and permission
+ Managing the water and compost systems
+ Plot registration, turnover, and orienting new gardeners
+ Assessing plot activity and enforcement of rules
+ Leadership, coordination, and communication with gardeners
+ Theft/Vandalism
+ Conflict
+ Work parties and communal space management
+ Shed and tool maintenance
+ Infrastructure maintenance and improvement

DIGGING DEEPER

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Photo by Scott Smith Photographics

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APPENDIX

GETTING STARTED RESOURCES | PAGES–18

BOOTS ON THE GROUND RESOURCES | PAGES 9–27

SUSTAINING YOUR GARDEN RESOURCES | PAGE 28

EXPANDING YOUR GARDEN RESOURCES | PAGES 29–30

GETTING STARTED CHECKLIST | ARE YOU READY?

GROWING YOUR TEAM | PAGES 5–8

+ Establish goals and objectives for garden.
+ Meet with principal to refine goals and get approval.
+ Meet with School Food Service, teachers, custodians, after-school program and club staff to introduce garden, gather ideas, and gauge support.
+ Make a date for an informational meeting with community stakeholders –including neighbors, parents, local-businesses, service clubs and organizations, farmers, UF/IFAS County Extension.

ENVISION YOUR GARDEN | PAGES 9–12

When choosing location, be sure to consider:

+ At least six hours of sun?
+ Good soil quality?
+ Close to water source?
+ Secure from vandalism and wild animals?
+ Ample tool storage?
+ Underground utility line check?

Decide on the type of garden and be sure to think about long-term goals for expansion and curriculum:

+ In-ground
+ Contained raised beds
+ Small container
+ Hydroponic

Develop garden maintenance plan:

+ Irrigation
+ Weather protection
+ Checking in on holidays
+ Holiday vacation plan

FUNDRAISING | PAGES 15–19

+ List supplies and projected costs (see cost worksheet).
+ Consult with principal for ideas.
+ Check with UF/IFAS County Extension agent.
+ Make a list of potential local funders.
+ Present plan at your stakeholder meeting and/or distribute letters of inquiry/request.

GETTING STARTED | BUDGET WORKSHEET 1

SUPPIES & COST CHART

ITEM	QUANTITY	PRICE
STRUCTURES		
In Ground	–	$0
Raised Bed	1 (100 sq. ft.) box	$50
Container: Self-watering	1 box	$10-50
Container: Traditional	1 pot	$15
Hydroponic Garden (baby pool)	1 pool	$25
IRRIGATION		
Micro-Irrigation	250 sq. ft. coverage	$35
Drip Irrigation	100 ft. tape	$60
Hose and Nozzle	100 ft. hose and nozzle	$50
OTHER SUPPLIES		
Media	1 cu. yd.	$15
Fertilizer	1 growing season	$35
Transplants	1 tray (150 plants)	$15
Seeds	100 Seeds	$5
Tools	Shovels, rakes, gloves, etc.	$90
Educational Supplies	Books, signs and labels	$150
Trellises and Other	Lattice, hardware, etc.	$100
Frost Cover	6 ft. x 50 ft. roll	$20

GETTING STARTED | BUDGET WORKSHEET 2

TYPE OF IRRIGATION _____

Coverage Needed _____ *divided by*

Quantity in Table 1 _____ = _____

multiplied by

Price in Chart on page 2 _____

TYPE OF GROWING SYSTEM

In Ground sq. ft. needed _____

Raised Bed sq. feet needed _____ *x $0.50 = $* _____

Earthbox # of boxes _____ *x $50 = $* _____

Garden Pot # of pots _____ *x $1 = $* _____

Hydroponic Pools # of pools _____ *x $25 = $* _____

OTHER SUPPLIES

NAME	PRICE	
_____	_____	=$ _____
_____	_____	=$ _____
_____	_____	=$ _____
_____	_____	=$ _____
_____	_____	=$ _____
_____	_____	=$ _____
TOTAL AMOUNT NEEDED		=$ _____

GETTING STARTED | UNITS OF MEASURE CONVERSIONS FOR GARDEN MULCH & TRANSPLANT MEDIA

HOW MUCH MULCH WILL I NEED?

1. A cubic yard (yd^3) is a unit of volume.

    1 yd^3 = 27 cubic feet (ft^3)

2. Most commercial brands of mulch is sold in bags = 2.8 ft^3.

    Therefore, you will need approximately 9 bags of material (~ 3 ft^3 each bag; 3 x 9 = 27ft^3) to equal 1 yd

3. 3. 1 yd^3 will cover 100 square feet spread 2–3 inches deep.

    1 ft^3 = of topsoil weighs about 90 pounds, depending on water content and packing method. 1 yd^3 of topsoil weighs approximately 2000–2800 pounds. Mulch weight by volume varies depending on the particle size and component ingredients.

HOW MUCH TRANSPLANT MEDIA WILL I NEED?

Most commercial brands of potting media are sold in bags = 2.8 ft^3.

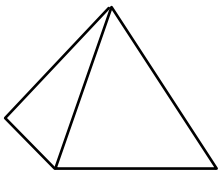
1. Convert cubic feet (ft^3) to inches: 12 inches = 1 foot.

    1 cubic foot = 12" long (L) x 12" wide (W) x 12" high (H) = 1728 cubic inches (in^3).

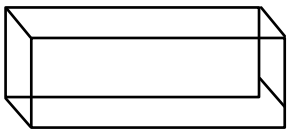
2. Calculate the number of in^3 in one bag of media:

    1728 in^3 x 2.8 ft^3 = 4838 in^3 per bag.

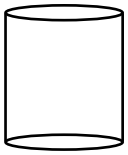
3. Determine the volume of the transplant container cell you will use:



PYRAMID | V = 1/3 x L x W x H



RECTANGLE | V = L x W x H



CYLINDER | $V = 3.142 \times r^2 \times H$

$$r = \frac{(\text{bottom r} + \text{top r})}{2}$$

4. The total number of cells that can be filled with one 2.8 ft^3 bag = 4838 in^3 divided by the cell volume.

EXAMPLE | A cell tray that is a pyramid shape measures 1.5" x 1.5" x 2.5". The volume of this cell = 1.875 in^3. Therefore, 4838 in^3 / 1.875 = 2,580 cells filled.

5. The total number of trays that can be filled with one 2.8 ft^3 bag = 4838 in^3 divided by (the volume of the container cell x the number of cells in the container).

EXAMPLE | A cell has a volume of 1.875. There are 128 cells in a tray. 1.875 x 128 = 240 in^3 4838 in^3 / 240 in^3 = 20 trays

GETTING STARTED | UNITS OF MEASURE & CONVERSIONS FOR GARDEN FERTILIZER

WHAT DO THE NUMBERS ON THE FERTILIZER BAG MEAN?

The numbers stand for the grade or analysis of nutrients in the bag. Grade or analysis means the minimum guarantee of the percentage of total nitrogen (N), phosphorus (P) measured in the oxide form (P_2O_5) and potassium (K) measured in the oxide form (K_2O) in the fertilizer. The numbers are always presented in the same order: N–P–K.

COMMON CONVERSIONS BETWEEN ELEMENTAL & OXIDE FORMS OF N-P-K

1 lb N = 1 lb N

1 lb P_2O_5= 0.44 lbs P

1 lb P = 2.29 lbs.P_2O_5

1 lb K_2O = 0.83 lbs K

1 lb K = 1.20 lbs K_2O

HOW DO I CONVERT PERCENT OF NUTRIENT TO POUNDS?

1. HOW MANY POUNDS OF N ARE IN A 50 LB. BAG OF 10–10–5? | Divide the percent N by 100 to get a fraction. Multiply that fraction of N by the number of pounds of material in the container to get pounds of N in a 50 bag.

EXAMPLE | A 50 lb. bag contains 10% N.

10% N ÷ 100 = 0.10

0.10 x 50 lbs fertilizer = 5 lbs of N.

2. HOW MANY POUNDS OF P AND K ARE IN A 50 LB. BAG OF 10–10–5? | Divide the percent of nutrient by 100 to get a fraction. Because P and K are reported as oxides on the label you must first determine the amount of element present in the oxide. To get P from P_2O_5 multiplying by 0.44. To get K from K_2O, multiply by 0.83.

EXAMPLE | A 50 lb. bag contains 10% P_2O_5.

10% P ÷ 100 = 0.10

0.10 x 0.44 x 50 lbs fertilizer = 2.2 lbs of P.

EXAMPLE | A 50 lb. bag contains 5% K2O.

5% K_2O ÷ 100 = 0.05

0.05 x 0.83 x 50 lbs fertilizer = 2 lbs of K.

In a 50 lb. bag of 10–10–5 fertilizer, there are 5 lbs of N, 2.2 lbs of P and 2 lbs of K.

For more information on calculating the amount of fertilizer needed in garden beds, please see the EDIS publication "Soil fertility and fertilizers: A Five-Session Short Course for Florida Producers" at: http://edis.ifas.ufl.edu/SS171

GETTING STARTED | GRANT OPPORTUNITIES 1

1. Florida Agriculture in the Classroom Teacher Grant
   http://flagintheclassroom.com/uploads/grants_24_32911170274.pdf

Accessible to certified Florida teachers engaged in classroom instruction at the prekindergarten through 12th grade who integrate agricultural concepts into non- agricultural curricula.

2. National Dairy Council Fuel Up to Play 60
   www.fueluptoplay60.com

Grants for up to $4000/school/year for nutrition and physical activity. Money for Physical activity must not be greater than that allocated for nutrition. Schools must be part of National School Lunch Program.

3. Youth Gardening Grant Award
   http://grants.kidsgardening.org/2013-youth-garden-grant-award

Sponsored by Home Depot. Five $1000 gift cards and ninety-five $500 gift cards. Applications due in the Fall/Winter annually.

4. Home Depot Team Depot
   http://www.homedepotfoundation.org/page/volunteerism

Local grants. Contact local Home Depot will build beds and donate plants.

5. Cabot Healthy Living Grants
   http://www.cabotcheese.coop/pages/community_and_you/

Cabot will provide matching funds of up to $200 for any qualifying program. Cabot created the matching grant process to encourage schools to reach out to their own local businesses, cooperatives, parent clubs and others.

6. Home Depot Community Impact Grants
   http://www.homedepotfoundation.org/page/grants

The Home Depot Community Impact Grants Program provides support to nonprofit organizations, public schools, and public service agencies in the U.S. that are using the power of volunteers to improve the physical health of their communities. Can be used for planting trees or community gardens and/or landscaping community facilities; and development of community parks or green spaces. Grants of up to $5,000 are made in the form of The Home Depot gift cards for the purchase of tools, materials, or services.

7. Jamba Juice: It's all About the Fruits and Vegetables, National Kids Gardening
   http://www.kidsgardening.org/grants/its-all-about-fruit-and-veggies/

GETTING STARTED | GRANT OPPORTUNITIES 2

8. Donorschoose.org Grant Opportunities

http://www.donorschoose.org/about

Teachers can put their project idea on the website, and a donor can choose to fund it. No deadline. No set amount rewarded.

9. Captain Planet Foundation

http://captainplanetfoundation.org/apply-for-grants/

Grants are made for activities that conform to the mission of the Captain Planet Foundation which is to promote and support high-quality education programs that enable children and youth to understand and appreciate our world through learning experiences that engage them in hands-on projects to improve the environment in their schools and communities.

10. Fiskars–Project Orange Thumb

http://www2.fiskars.com/Community/Project-Orange-Thumb

Eleven recipients are chosen from applications–ten will receive $5,000 in cash and tools to help support their goals of neighborhood beautifications and horticulture education, and one lucky applicant will receive a complete garden makeover.

11. Lowe's Toolbox for Education

http://www.toolboxforeducation.com/

Accessible to any K-12 school or non-profit parent group.

12. American Honda Foundation

http://corporate.honda.com/america/philanthrophy.aspx?id=ahf

Funding Priority: Youth education, specifically in the areas of science, technology, engineering, mathematics, the environment, job training, and literacy. These are large grants ranging from $20,000–$75,000 for a year. There are four submission deadlines throughout the year but only one request per 12 month period.

13. Annie's Homegrown—Grants for Gardens

http://www.annies.com/school-gardens/grants-for-gardens/

Accessible to K-12 schools, applications due in Spring.

14. Do Something Seed Grants

http://www.dosomething.org/grants/seed-grants

Applicants must be 25 or under and U.S. or Canadian citizen. $500 grants are awarded weekly.

GETTING STARTED | GRANT OPPORTUNITIES 3

15. The Fruit Tree Planting Foundation

http://www.ftpf.org/fruittree101.htm

"Fruit Tree 101" is a program that brings fruit tree orchards to school yards so students can improve the quality of the air and water while creating a source of tasty snacks for decades to come. There are no deadlines for this program.

16. Adopt a Classroom.org

http://adoptaclassroom.org/index.aspx

Teachers can register their classroom and it will be posted on the Adopt-a-Classroom website available for donors to select. When adopted, teachers will have full discretion to purchase items that meet unique classroom needs. There are no deadlines for this program.

17. Wells Fargo | Corporate Giving

https://www.wellsfargo.com/about/charitable/fl_guidelines

Accessible to schools and non-profit organizations in certain counties of Florida (check website for eligibility). Grants may be submitted throughout the year.

RESOURCES | Must submit letter of inquiry to receive grant information.

1. USDA "Preparing Successful Federal Grant Applications" Power Point
   www.agclassroom.org/naitc/ppt/speca.ppt

2. Associated Grant Makers–Common Proposal Form to make grant application easier
   http://www.agmconnect.org/cpf/

3. The Center for Health and Healthcare in Schools–list of grant opportunites
   http://www.healthinschools.org/News-Room/Grant-Alerts.aspx

4. Alliance for a Healthier Generation–List of grant opportunities
   http://www.healthiergeneration.org/schools.aspx?id=4578

5. USDA Team Nutrition Grant Resources
   http://healthymeals.nal.usda.gov/professional-career-resources/grants/resources- locate-grants

6. No Kid Hungry
   http://www.nokidhungry.org/solution/community-investments

BOOTS ON THE GROUND CHECKLIST | LET THE GARDENING BEGIN

GARDEN CONSTRUCTION | WORKDAY PREPARATION | PAGES 22–24

- + Decide on individual tasks and task leaders.
- + Print instructions as needed for different tasks to be made available to leaders.
- + Designate who will gather/buy supplies.
- + Designate who will manage volunteers during event.
- + Designate who will be responsible for using tools for construction.

PLANTS FOR YOUR GARDEN | PAGES

- + Choose plants appropriate to the season with a harvest date compatible with school schedule.
- + Decide on method of setting out plants–seeds, transplants, making own transplants.
- + Decide on source of plants or seeds.
- + Decide on type and source for mulch for beds and for walkways.
- + Plan your garden layout.
- + Decide on a crop rotation plan.

MAINTAINING THE GARDEN

- + Decide on a method of irrigation.
- + Designate who will be responsible for weekend or holiday watering.
- + Designate who will be responsible for weeding beyond what students can do during gardening periods.
- + Make fertilization and soil amendment plan based on soil test.
- + If composting, decide on type of containment and a plan for educating participants on safety.
- + Know which plants will need trellising and decide on trellising method and source of supplies.
- + Designate who will watch weather during cold snaps and decide on a plan (and participants) for frost protection.
- + Understand Integrated Pest Management.
- + Designate who will be responsible for decisions regarding and implementation of pest and disease remedies.
- + Make a summer plan for the garden.

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Making & Planting Grow Buckets

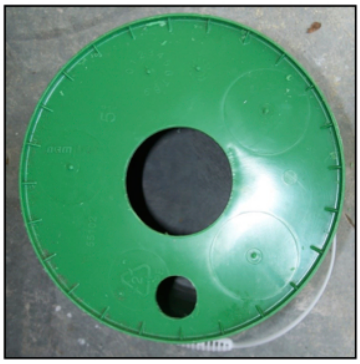
Grow Buckets are sub-irrigated planters that can be used to grow a wide variety of vegetables. They are an easy and inexpensive do it yourself project. Grow Buckets use less water, are low maintenance, take little space and can be placed in any sunny location.

Materials & Tools:

- Two 5 gallon buckets for planting and water reservoir (new or used food grade). Best buckets are those with "2" symbol = high density polyethylene (HPDE).
- 16 ounce plastic cup for a wick cup.
- 24 inch piece of 1 inch PVC Pipe for the fill tube.
- 24 inch square of opaque plastic for mulch.
- Electric drill.
- 3 ½ inch hole saw, 1 3/8 hole saw or paddle bit, ¼ inch drill bit.

Drilling Instructions:

- Drill a 3 ½ inch hole in the center of the planting bucket for the wick cup.
- Drill 1 3/8 inch hole near the outer edge of the planting bucket for the fill tube.
- Drill at least 30 ¼ inch holes around the entire bottom of the planting bucket.
- Drill ¼ inch holes on two sides of the reservoir bucket allowing a ¾ inch air space between the bottom of the planting bucket and water level.
- To determine the height of the over flow holes, place the planting bucket in the reservoir bucket and measure from the bottom bucket to the wick cup hole.
- Drill ¼ inch holes in the bottom and sides of the wick cup.
- Drill several ¼ inch holes in to bottom of the fill tube to allow faster water flow.



Selecting & Preparing Soil:

- Use good quality potting soil1 cubic foot bag will fill one grow bucket.
- Soil needs to be thoroughly moistened before adding to wick cup or bucket.

Filling Grow Bucket:

- Pack the soil tightly in the wick cup.
- Place wick cup in center hole of the grow bucket.
- Place the fill tube in the side hole making sure the end with the holes is in the water reservoir bucket.
- Pack soil tightly in the bottom third of the grow bucket to avoid any air pockets.
- Mix one cup of dolomite lime in remaining soil.
- Fill the bucket and mound the soil in the center until it resembles a loaf of bread.
- Add granular fertilizer around the outer edge of the mounded soil.
- Use one cup of 8-8-8 or two cups of organic fertilizer.
- Cover fertilizer with a thin layer of soil.

Planting Grow Bucket:

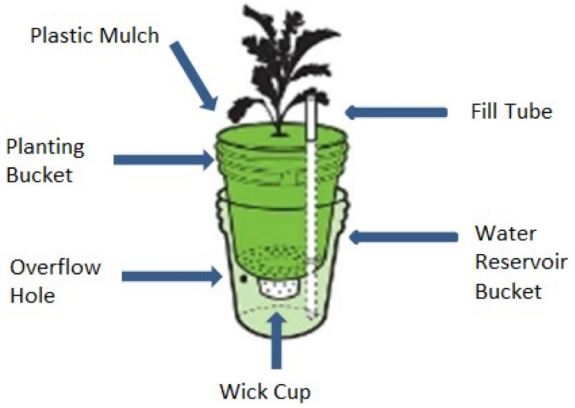
- Cut a hole in plastic mulch for the fill tube.
- Cut a small hole in the center of the mulch for the plant.
- The mulch can be put in place before or after planting the plant.
- Secure the mulch around the bucket with the rubber ring from the bucket lid or twine.

Watering Grow Bucket:

- Water using the fill tube until water begins to seep out of overflow holes.
- Small new plants will need to have water added every two to three days.
- Mature plants may need water added daily.
- Rain does not water grow buckets because of the plastic mulch.
- The wick cup can only maintain moisture, it cannot water a bucket that has been allowed to dry out.
- If a bucket does dry out, lift the plastic mulch and gently add water to remoisten the soil in the grow bucket.

What to Plant:

- Don't overcrowd the bucket.
- One eggplant, okra, pepper or tomato.
- One bush squash or cucumber.
- Two vining squash or cucumber plants.



Tips:

- A stake or a trellis may be needed to support tall or vining plants.
- Once season is completed, materials can be reused. Replace with fresh soil.

By Kay Robbins and Terry DelValle

"The Foundation for the Gator Nation" an Equal Employment Opportunity Institution.

BOOTS ON THE GROUND | WEB RESOURCES

FLORIDA VEGETABLE GARDENING GUIDE
http://edis.ifas.ufl.edu/vh021

UF/IFAS EXTENSION EDIS ORGANIC VEGETABLE GARDENING IN FLORIDA
http://edis.ifas.ufl.edu/hs1215

USDA SAFETY TIPS FOR SCHOOL GARDENS
http://nfsmi.org/documentlibraryfiles/PDF/20110822025700.pdf

BOOTS ON THE GROUND | 20 VEGETABLES FOR YOUR SCHOOL GARDEN

WARM WEATHER

GREEN BEANS | Some grow up poles, others as little "bushes." The purple variety are fun and also easy to spot; they turn green when cooked.

SEMINOLE PUMPKINS | These are native to our state and were cultivated by early Native Americans. They can be planted in late spring and will grow over the summer, if you have someone to look after them occasionally. They are a fun thing to return to in the fall!

CUCUMBERS | A favorite in many ways–raw, or soaked in brine for "refrigerator pickles".

CORN | Corn needs to be planted in "blocks" rather than rows. It takes up a lot of garden space.

EGGPLANT | The white variety are especially fun. They really look like eggs.

PEPPERS | Sweet and crunchy favorites. Avoid hot peppers as even touching them can burn.

SQUASH | Great for learning about flower parts and pollination.

SUNFLOWERS | Not a vegetable, but who can resist? They are magical, and they produce edible seeds that are easy to save.

ROSELLE | Their flower calyxes make a bright red tea, rich in vitamins. In the warmest parts of the state, these hibiscus relatives are perennials. In cooler areas, they can endure the summer heat with a little care, and be ready to harvest before the first frost.

TOMATO | In our state, cherry tomatoes can be easier to grow than larger ones. They are also delightfully sweet.

COOL WEATHER

BEETS | These may have a bad reputation among kids, but most find them pretty and tasty grated raw into a salad.

BROCCOLI | Students–and many teachers–will find these plants fascinating. Who knew that the broccoli we eat is actually flower buds?

CARROTS | Fun to pick, fun to eat, but a little tricky to plant (their seeds are tiny). Kids love them.

SWISS CHARD | Plant the "Bright Lights" or other colorful variety. Beautiful and mild tasting.

"GREENS" | Collards/Mustard/Turnip–A southern tradition with an African history. These well-loved veggies thrive in cool weather and are packed with nutrients. Kale is a less traditional southern relative but is enjoying a lot of popularity lately.

LETTUCE | Plant a variety of shapes and colors for a beautiful salad. Sow every two weeks for a continual harvest.

SWEET ONIONS | These grow well during the cold months and are interesting to watch grow partially above ground.

SWEET PEAS | Beautiful growing along a garden fence, and you can eat them raw!

POTATOES | Harvesting potatoes is like digging for gold! Plant in January for late spring harvest.

RADISH | So many colors and shapes! Their extremely quick growing period (three weeks from seed to harvest) makes them great for inpatient children. Plant with slower growing carrots.

STRAWBERRIES | Beautiful, tasty, with interesting seeds, we grow them as annuals in most parts of Florida.

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SEED STARTING UNDER LIGHTS Fact Sheet #52

By Alachua County Master Gardeners Anne Marie Mattison, Leslie Roseman, Alicia Nelson, and Wendy Wilber, Horticulture Extension Agent, March 8, 2007

Have you wished that you could start seeds indoors under lights during the cold months of winter like the professionals do? Have you been given seeds by a friend that you would like to give the best possible start? Imagine having plants ready to go into the garden at the first frost free date in your area! Listed here is a way to do that, with purchased materials that are a fraction of the cost of ready made seed starter lighting kits. A search of the internet for ready made seed starter kits with lights found a large variety of prices, beginning at $70! A seed starter light, as illustrated and discussed in this article, cost approximately $25 in materials; seeds, trays and soil are extra. A timer is included in the materials list, since the lights need to be on for 18 hours per day. A timer ensures that the plants receive sufficient light per day. One could forego the timer but only if the light source is consistently turned on and off at an 18 hour interval on a daily basis. PVC glue may be used when connecting the pieces of piping for a permanent bond. However, if one wishes to disassemble the pieces for storage, do not use PVC glue. Prices for all materials are included in this article.

Figure 1. Assembled seed light

Materials List, with costs
(Purchased at Lowes 2/13/07)

(1) Schedule 40 PVC pipe 1" x 10'	$1.82
(2) Schedule 40 PVC pipe 1" tee (.66)	$1.32
(4) Schedule 40 PVC pipe 1" elbow (.53)	$2.12
(1) Two-lamp shop light fixture 4'	$7.92
(1) Pkg of two 40W fluorescent lamps 4'	$3.98
(1) Electric timer	$7.07
TOTAL:	**$24.23**

Instructions:

1. Do this step first. From the 10' length of PVC, have the home store cut, or cut at home with a hack saw, hand saw or any power saw:

    a. Four 12" legs – cut evenly!
    b. Four 6" cross bars – cut evenly!

When finished cutting, you will have approximately a 4' length of PVC pipe. This will be the fluorescent light support bar from which the light is suspended. It can vary by several inches and will be okay.

Assembly of PVC frame:

(Note: if using PVC glue for a permanent bond, use in a well ventilated area)

2. To make a leg assembly, take one tee and insert two of the 6" pieces of PVC pipe into the crossbar of the tee.
3. Insert elbows on the ends of the two PVC 6" pipes.
4. Insert a 12" long PVC leg into each of the two elbows. *(See Figure 2)*

Figure 2 Side detail

5. Repeat steps 2 through 4 to create leg assembly.

Installation of shop light onto frame:

1. Unpack the light.
2. There should be instructions with the light fixture, and generally, they will follow the instructions here: pull out the chains (there should be one for each end) and the "S" hook type of fastener. Loop the end of the chain through the "S" hook so that you can create a loop that is large enough for the PVC pipe to go through. The height can be adjusted as much as the chain will allow. *(See Figure 3)*

Figure 3 Detail of chain and "S" hook attachment

3. Insert the "S' hook with the chain attached into the slot on the top surface of each end of the light fixture.
4. Install the lamps in the light fixture.
5. Thread the approximate 4' long piece of PVC pipe through the two chains that will support the light fixture.
6. Insert the approximate 4' long piece of PVC into the open end of the tee on one of the leg assemblies. Do the same for the opposite end twisting the leg assembly pieces as necessary to align properly.

Seed Starting Under Lights

1. Before starting seeds indoors check the seed package to learn how many weeks before the last frost date the seeds should be planted. The average last frost date in Gainesville is March 10th.
2. Select your containers. If they have previously been used, clean them using a 10% bleach and water solution to destroy any disease organisms present.
3. Use a sterile, well drained planting medium. Commercial mediums especially formulated for seed starting work well.
4. Add tepid water to your planting medium so that it is evenly moist but not wet.
5. Fill your containers with the seed starting medium and tamp it down so that the surface is level and within ¼ to ½ inch from tops of the containers. This will prevent water run off.
6. Plant your seeds to the depth the seed package recommends. This is usually 2 to 3 times the diameter of the seed. Tiny seeds can be pressed into the medium. (Check to see if the seeds need light to germinate and if so sprinkle them on the surface).
7. Plant at least 3 seeds in each container because not all seeds will germinate and any extra seedlings can be thinned out later.
8. Gently tamp the medium to obtain good seed to soil contact.
9. Label your pots with the type of seed and the date sown.
10. Water the seeds. Bottom watering, if possible, is best because it doesn't disturb the seeds but bottom watering is not recommended for paper pots. Misting is also effective. You can cover the containers now until the seeds germinate to help maintain moisture.
    - Try to keep the growing temperatures at 60 to 75 degrees Fahrenheit during the day and above 50 degrees during the night unless the seeds need cool temperatures to germinate. Adding bottom heat can help germination but too much heat, once germinated, can cause leggy plants.
    - Once they have germinated keep the seedlings 1 to 3 inches below the fluorescent light bulb for 14 to 18 hours a day. Remember that the light in the center of the bulb is stronger than the light at the ends so rotate your plants. If you are using full spectrum grow lights, check to see the manufacturers' recommendations for growing seedlings.
    - To prevent "damping off", a fungal disease that attacks seedlings, maintain good air circulation. Using a small fan at low speed helps.
    - When true leaves form, fertilize the seedlings at ¼ the recommended strength.
    - When two sets of true leaves form, it's time to transplant seedlings into individual pots if they were started in flats.
    - Before planting your seedlings harden them by gradually exposing them to outside growing conditions for a week or so.

Wendy L. Wilber
Environmental Horticulture Agent

Reference: An introduction to the Production of Containerized Vegetable Transplants HS 126 Charles S. Vavrina University of Florida EDIS document http://edis.ifas.ufl.edu/HS126

Funding for the duplication of this publication is provided in part by the Alachua County Board of County Commissioners.

BOOTS ON THE GROUND | TOP TWELVE WEEDS OF FLORIDA 1

CRABGRASS | *digitaria, spp.*

Five crabgrass species are prevalent in Florida: India crabgrass, blanket crabgrass, southern crabgrass, tropical crabgrass, and smooth crabgrass. Most are summer annuals, but blanket and India crabgrass tend to live longer than one growing season.

COMMON BERMUDAGRASS | *Cynodon dactylons*

Cynodon dactylons is a coarse-textured, warm-season turfgrass that spreads by rhizomes (underground stems). It is often found in pastures or on roadsides in Florida.

GARDEN SPURGE | *Chamaesyce hirta*

A summer annual that can be sprawling or upright. It usually grows 12-14 inches tall in the warm months. Stems have milky sap. The leaves have toothed margins and are hairy. The tiny brownish green flowers occur in the axils of the leaves. It reproduces easily from seed.

NUTSEDGE | *cyperus, spp .*

A smooth, upright, perennial sedge that resembles a grass. Nutsedges grow mainly from tubers formed on underground, horizontal stems called rhizomes, mostly in the upper foot of soil. Sprouts from tubers are similar in appearance to the mature plant.

CHAMBER BITTER | *Phyllanthus urinaria*

Chamberbitter is a summer weed that is usually introduced into our landscapes and lawns from weedy nursery stock. It is native to Asia but is seen as a weed throughout the Gulf States. The weed ranges from 2 inches to 18 inches in size and it can grow in shady or full sun conditions.

BEGGAR'S TICK or SPANISH NEEDLE | *Bidens alba*

Common Beggar's-tick is an annual or short-lived perennial with a tap root. The flowers are daisy-like. The seeds detach easily and cling to passing animals and people. The seeds germinate easily. One plant produces an average of 1,205 seeds.

BOOTS ON THE GROUND | TOP TWELVE WEEDS OF FLORIDA 2

YELLOW WOOD SORREL

Wood Sorrels can be annual (Oxalis florida) or perennial (Oxalis corniculata). This plant looks like a clover with three leaflets on a single stem.

PIGWEED or SPINY AMARANTH | *Amaranthus spinosus*

An erect annual with smooth, branched red stems, usually 1-3 feet tall but can be taller. Stems have a pair of ¼-inch long sharp spines in the axil of each leaf. Leaves are alternate with long stalks, ½-4 inches long, usually egg-shaped or oval. Spiking flower clusters are located at the tip of stems. Pigweed is related to the grain amaranth and is edible.

DOLLARWEED or PENNYWORT | *Hydrocotyle spp.*

A perennial weed with erect, bright green, shiny, umbrella-shaped leaves with scalloped margins. It reproduces via seeds and underground stems. Pennywort is found in moist to wet sites.

CUDWEED | *Gnaphalium pensylvanicum*

Annual weed with green leaves whose undersides are covered with thick, white hairs. Stems are also hairy. Small pink to purple flowers.

FLORIDA BETONY or RATTLESNAKE WEED | *Stachys floridana Shuttlew*

A square-stemmed, hairy perennial which spreads by seeds, and underground stems and tubers. The tubers are segmented and resemble a rattlesnake's white rattle, usually up to 4 cm long and about 1 cm wide. Tubers are edible.

TORPEDOGRASS | *Panicum repens*

A perennial grass with robust, creeping, sharply pointed rhizomes. Stems are stiff with leaves that are folded or flat and sparsely hairy on the upper surface. Reproduction occurs primarily by underground stems called rhizomes.

BOOTS ON THE GROUND |
NO PESTICIDE APPROACHES TO GARDEN PEST CONTROL 1

Adapted from the Florida Vegetable Gardening Guide–SP #103, http://edis.ifas.ufl.edu/vh021

+ Follow the recommended planting date(s) listed for each vegetable. Vegetables planted "out of season" are very susceptible to many pests. Plant as early in the spring (or as late in the fall, depending on the crop) as is safely possible. Use protective covers for cold-sensitive plants.

+ Rotate vegetables so that the same vegetable (or members of the same vegetable family) are not planted repeatedly in the same areas. The plant family for each vegetable is listed in Table 3 of the Florida Vegetable Gardening Guide: http://edis.ifas.ufl.edu/vh021.

+ Till or hand-turn the soil well in advance of planting. Insects, such as mole crickets and wireworms, for which there is no good control, are commonly more abundant in gardens that have recently been in grass. The garden should be well tilled and free of weeds, grass, and woody material at least 30 days before planting.

+ Control weeds in and around the garden because they can be a source of insects and diseases. Weed control is best accomplished by mulching and hand-pulling or hoeing small weeds. Recommended mulches are straw, fallen leaves, and unfinished compost. Wood mulches and un- decomposed sawdust should not be used. Weeds around the outside of the garden and between rows can be reduced by putting down several layers of newspaper and then covering them with leaves.

+ Choose adapted varieties with resistance or tolerance to nematodes and the diseases common in your area.

+ Purchased transplants should be free of insects and disease symptoms (such as leaf spots or blights). Avoid transplants that are already flowering. Consider growing your own from seed.

+ Plants can be protected from cutworms by placing a “collar” around the plant. The collar can be made from a bottomless plastic cup or a waxed cardboard carton. The collar should extend a few inches above and at least an inch below the surface of the ground.

+ Lightweight row covers (also called floating row covers) can be used as a barrier to insects. Put in place at planting stage, with lots of excess material to leave room for the growing plant. Remove the cover when plants that need bees for pollination begin to flower (i.e., vegetables listed in Table 3 as members of the Cucurbitacae Family).

+ Keep plants vigorously growing and in a state of good health by supplying appropriate amounts of water and fertilizer. A healthy plant is often able to survive insect attacks. Too much nitrogen, however, can make plants more inviting to aphids and whiteflies.

+ Monitor or scout the garden twice weekly for pest problems. This includes inspecting the plants from the bud to the soil, including both upper and lower leaf surfaces. Record notes on pest problems and the performance of different varieties. Include photographs of insects, diseases, and beneficial insects that you find.

BOOTS ON THE GROUND | NO PESTICIDE APPROACHES TO GARDEN PEST CONTROL 2

+ Learn to identify beneficial insects (praying mantis, spiders, big-eyed bugs/assassin bugs, lady beetles, and all wasps). Some of these insects can be purchased, but keep in mind that many beneficial insects exist naturally in Florida, and purchased beneficials will leave if there are no insects for them to eat.

+ Plant flowers in the vegetable garden. They provide nectar and pollen that attract beneficial insects.

+ Large insects can be removed by hand and destroyed. Place them in a container of soapy water, where they will sink and drown.

+ Watch for early disease symptoms. Remove any diseased leaves or plants to slow spread.

+ Most plants that produce fruits, pods, or ears can stand a 10-20 percent loss of leaves without loss of potential yields. Do not panic at the first sign of leaf feeding.

+ Harvest crops such as tomatoes, peppers, squash, and beans as soon as they are ripe. Allowing over-ripe fruits to remain on the plants often invites additional insect problems.

+ As soon as a plant or crop is no longer productive, remove it from the garden and compost or dispose of it.

+ Reduce nematode populations temporarily by "soil solarization" – a technique that uses the sun's energy to heat the soil and kill soil-borne pests. To "solarize" soil, first remove vegetation, then break up and wet the soil to activate the nematodes. Cover the soil with sturdy, clear-plastic film. Weight down the edges with additional soil to keep the plastic in place. Soil solarization should be done during the warmest six weeks of summer. High temperatures (above 130°F) must be maintained for best results.

+ Add organic matter to the soil to help reduce nematode populations –microscopic worms that attack vegetable roots and reduce growth and yield. Organic matter improves the capacity of the soil to hold water and nutrients and, in turn, improves plant vigor and resistance to pests.

See also EDIS Publication CIR375, Organic Vegetable Gardening (http://edis.ifas.ufl.edu/VH019).

BOOTS ON THE GROUND | PLANTING & HARVESTING GUIDE 1

	PLANTING DATES IN FLORIDA (OUTDOORS)			APPROXIMATE HARVEST MONTHS			DAYS TO HARVEST
CROP	**NORTH**	**CENTRAL**	**SOUTH**	**NORTH**	**CENTRAL**	**SOUTH**	
Beans *Bush*	Mar–Apr Aug–Sep	Febr–Apr Sep	Sep–Apr	May–June Oct–Dec	April–June Nov–Dec	Nov–June	50–60
Beans *Pole*	Mar–Apr Aug–Sep	Feb–Apr Aug–Sep	Aug–Apr	May–June Oct–Dec	April–June Oct–Dec	Oct–June	55–70
Beans *Lima*	Mar–Aug	Feb–Apr Sep	Aug–Apr	June–Nov	May–June	Nov–June	65–75
Beets	Sep–Mar	Oct–Mar	Oct–Feb	Nov–May	Jan–May	Jan–May	50–65
Broccoli	Aug–Feb	Aug–Jan	Sept–Jan	Nov–May	Nov–April	Dec–April	75–90
Cabbage	Sep–Feb	Sep–Jan	Sept–Jan	Jan–May	Jan–April	Jan–April Nov–Jan	90–110 (70–90)
Cantaloupe	Mar–Apr	Feb–Apr	Aug–Sep Feb–Mar	June–July	May–July	May–June	75–90 (65–75)
Carrots	Sep–Mar	Oct–Mar	Oct–Feb	Dec–May	Jan–May	Jan–April	65–80
Cauliflower	Jan–Feb Aug–Oct	Oct–Jan	Oct–Jan	April–May Nov–Feb	Jan–April	Jan–April	75–90 (55–70)
Celery	Jan–Mar	Aug–Feb	Oct–Jan	June–Aug	Jan–Aug	Mar–June	115–125 (80–105)
Cabbage *Chinese*	Oct–Feb	Oct–Jan	Nov–Jan	Jan–May	Jan–April	Feb–April	70–90 (60–70)
Collards	Feb–Apr Aug–Nov	Aug–Mar	Aug–Feb	May–Aug Nov–Feb	Nov–June	Nov–May	70–80

BOOTS ON THE GROUND | PLANTING & HARVESTING GUIDE 2

	PLANTING DATES IN FLORIDA (OUTDOORS)			APPROXIMATE HARVEST MONTHS			DAYS TO HARVEST
CROP	**NORTH**	**CENTRAL**	**SOUTH**	**NORTH**	**CENTRAL**	**SOUTH**	
Corn *Sweet*	Mar–Apr Aug	Feb–Apr Sep	Sep–Apr	June–Aug Nov	May–July Nov–Dec	Nov–July	60–95
Cucumbers	Feb–Apr Aug–Sep	Feb–Apr Aug–Sep	Aug–Apr	April–June Oct–Dec	April–May Nov–Dec	Nov–May	50–65 (40–50)
Eggplant	Feb–July	Feb–Apr Sep	Aug–Apr	June–Nov	May–Aug Jan–March	May–July Dec–June	90–110 (75–90)
Endive or *Escarole*	Feb–Mar Sep	Oct–Mar	Oct–Feb	June Jan	May–June Jan	Jan–May	80–95
Kale	Sep–Feb	Aug–Jan	Sept–Jan	Dec–May	Dec–April	Dec–April	70–80 (55)
Kohlrabi	Sep–Mar	Sep–Jan	Sept–Jan	Dec–June	Jan–June	Jan–April	70–80 (50–55)
Lettuce *Crisp, Butter-head, Leaf & Romaine*	Feb–Mar Sep–Oct	Feb–Apr	Aug–Sep Feb–Mar	April–May Nov–Feb	Nov–June	Nov–May	50–90
Mustard	Sep–May	Oct–Mar	Oct–Feb	Nov–July	Nov–May	Nov–May	40–60
Okra	Mar–July	Oct–Jan	Oct–Jan	May–Oct	May–Nov	Oct–Dec	50–75
Onions *Bulbing*	Sep–Dec	Aug–Feb	Oct–Jan	Mar–June	Mar–June	Mar–May	120–160 (110–120)
Onions *Bunching*	Aug–Mar	Oct–Jan	Nov–Jan	Oct–June	Oct–June	Nov–June	50–75 (30–40)
Onions *Shallots*	Aug–Mar	Aug–Mar	Aug–Feb	Oct–June	Oct–June	Nov–June	30–40

	PLANTING DATES IN FLORIDA (OUTDOORS)			APPROXIMATE HARVEST MONTHS			DAYS TO HARVEST
CROP	**NORTH**	**CENTRAL**	**SOUTH**	**NORTH**	**CENTRAL**	**SOUTH**	
Peas *English*	Jan–Mar	Sep–Mar	Sep–Feb	Mar–May	Nov–May	Nov–April	50–70
Peas *Southern*	Mar–Aug	Mar–Sep	Aug–Apr	June–Nov	June–Oct	Nov–July	60–90
Peppers	Feb–Apr July–Aug	Jan–Mar Aug–Sep	Aug–Mar	June–Oct Nov–Jan	May–Aug Nov–Jan	Nov–Aug	80–100 (60–80)
Potatoes	Jan–Mar	Jan–Feb	Sep–Jan	May–Aug	May–July	Jan–June	85–110
Potatoes *Sweet*	Mar–Jun	Feb–Jun	Feb–Jun	Sept–Jan	Oct–Jan	Oct–Jan	120–140
Pumpkin	Mar–Apr Aug	Feb–Mar Aug	Jan–Feb Aug–Sep	July–Oct Dec–Feb	Jun–Sept Dec–Feb	May–June Dec–Feb	90–120 (80–110)
Radish	Sep–Mar	Sep–Mar	Oct–Mar	Oct–April	Oct–April	Nov–April	20–30
Spinach	Oct–Nov	Oct–Nov	Oct–Jan	Dec–Mar	Dec–Mar	Dec–April	45–60
Squash *Summer*	Mar–Apr Aug–Sep	Feb–Mar Aug–Sep	Jan–Mar Sep–Oct	May–June Nov–Dec	April–May Nov–Dec	Mar–May Nov–Jan	40–55 (35–40)
Squash *Winter*	Mar–Aug	Feb–Mar Aug	Jan–Feb Sep	July–Sept Dec–Feb	June–Sept Dec–Feb	May–June Jan–Mar	80–110 (70–90)
Strawberry	Oct–Nov	Oct–Nov	Oct–Nov	Feb–April	Feb–April	Feb–April	90–110
Tomatoes *Stake*	Feb–Apr Aug	Jan–Mar Sep	Aug–Mar	June–Sept Nov/Dec	May–Sept Dec/Jan	Dec–Nov	90–110 (75–90)

BOOTS ON THE GROUND | PLANTING & HARVESTING GUIDE 4

	PLANTING DATES IN FLORIDA (OUTDOORS)			APPROXIMATE HARVEST MONTHS			DAYS TO HARVEST
CROP	**NORTH**	**CENTRAL**	**SOUTH**	**NORTH**	**CENTRAL**	**SOUTH**	
Tomatoes	Mar–Apr	Febr–Apr	Sep–Apr	June–Sept	May–Sept	Dec–Nov	90–110
Ground	Aug–Sep	Sep		Nov/Dec	Dec/Jan		(75–90)
Tomatoes	Mar–Apr	Feb–Apr	Aug–Apr	Mar–June	Mar–May	Dec–Nov	90–110
Container	Aug–Sep	Aug–Sep					(75–90)
Turnips	Mar–Aug	Feb–Apr	Aug–Apr	Oct–Dec	Nov–Jan	Dec–April	40–60
		Sep					
Watermelon	Sep–Mar	Oct–Mar	Oct–Feb	June–Aug	May–July	May–July	85–95
Large				Nov–Dec	Dec	Dec–Jan	(80–90)
Watermelon	Aug–Feb	Aug–Jan	Sept–Jan	June–Aug	May–July	May–July	85–95
Small				Nov–Dec	Dec	Dec–Jan	(80–90)
Watermelon	Aug–Feb	Aug–Jan	Sept–Jan	June–Aug	May–July	May–July	85–95
Seedless				Nov–Dec	Dec	Dec–Jan	(80–90)

BOOTS ON THE GROUND | VEGETABLE HARVEST GUIDE

WHAT TO LOOK FOR

While the harvest guide provides the number of days between planting and harvesting, the actual harvest time can be affected by temperature and rainfall. The following guide tells what to look for in different types of vegetables before harvesting.

GREEN BEANS | Smaller pods are more tender, but can be harvested until the seeds within cause the pod to bulge.

BEETS | Harvest when roots are 1 1/2 to 2" in diameter. The tops can be used for greens, if tender.

BROCCOLI | Optimally, these should be harvested when the terminal (main) head is still tight and dark green in color, although they still can be harvested through blooming.

CARROTS | Pull when roots are 3/4" to 2" in diameter and before summer heat.

COLLARDS | Cut at ground level or harvest continuously by cutting outer leaves when they are 8–12" long.

SWEET CORN | Harvest when silks are brown and dry, about 18 to 20 days after silks emerge. Pull down on ear and twist.

CUCUMBERS | Harvest in early morning when green and immature. Size depends on variety and use.

EGGPLANT | Clip with pruning shears when glossy and firm. Over mature fruit are dull and spongy.

KALE | Harvest continuously by cutting older leaves when they are 6–10"long, depending on variety.

LEAF LETTUCE | Cut entire head or outer leaves for continual harvest before plant begins to bolt and leaves decrease in size (and become bitter).

GREEN ONIONS | Pull when needed as they reach desired size.

BULBING ONIONS | Harvest when 50% of tops fall over and bulbs 2 inches or more in diameter. Lift and dry for several hours; remove tops and roots and put in warm, dry area for 72 hours. Then store in cool, dry, well-ventilated space.

ENGLISH PEAS | Pick when pods are full and seeds are full size, but immature. Continue to harvest every 2–3 days.

SNOW PEAS | Pick every other day, usually 5 to 7 days after flowering and when pods are still flat.

PEPPERS | Clip when fruit are full size, but firm. Color will depend on ripeness and variety.

IRISH POTATO | For new potatoes, dig tubers before plants die. For traditional size potatoes, allow plants to die and harvest 2 to 3 weeks after. Apply no irrigation during this time. Place tubers in dark, cool, ventilated place for 10 to 14 days to cure.

SWEET POTATO | Dig before killing frosts and/or when tubers reach adequate size. You will probably need to feel for the potatoes under the soil to determine size. Cure in warm, well-ventilated area for 1 week before storing.

PUMPKINS + WINTER SQUASH | Harvest when fully colored and skin is hardened. Leave 1" of stem attached.

RADISH | Pull when small and tender for optimum flavor and texture.

SQUASH, SUMMER | Pick when young and tender. Harvest zucchini when 6 to 8 inches long and yellow squash when 3 to 4 inches in diameter.

STRAWBERRIES | Wait until they are deep red and fragrant before picking.

TOMATO | Harvest when color change is uniform and fruit is firm at blossom end. Before a frost harvest green, full size fruit and wrap in newspaper and keep at room temperature to ripen.

TURNIP | Harvest when roots are 1 to 3" in diameter. If over-mature, they become woody.

–Terry DelValle, UF/IFAS, Duval County Extension

BOOTS ON THE GROUND | FOOD SAFETY SUMMARY 1

The five S's of school garden food safety are safe soil, safe water, safe hands, safe food, and safe surfaces. For each of these areas, follow these guidelines to reduce the risk of exposing the food grown in your garden to contaminants from water, soil and fertilizers, hands, kitchens, and classrooms.

SAFE SOIL

+ Locate the garden away from wells, septic systems, in-ground tanks, and dumpsters.
+ Contact utilities before digging. Call 811.
+ Avoid areas where water collects. Not only do vegetables and herbs not grow well when their roots are constantly wet, but standing water also increases the possibility of soil contamination by pathogens (disease-causing organisms).
+ Test soil for lead, if you plan an in-ground garden. All soils will have a natural, background level between 5 ppm and 40 ppm. Do not locate school gardens in an area where the total estimated lead level is above 300 ppm.
+ Compost may be a source of pathogens if it is not managed properly. In order to be safe, use commercially sourced compost that is certified pathogen free.
+ If you chose to make your own compost, follow the guidelines in the Boots on the Ground pages 45–46.

SAFE WATER

+ Municipal tap water or water from a properly designed, deep water well are preferred sources for water used to wash vegetables and hands.
+ If using water from a well, ensure that the casing is maintained, grouted, and that it is not located in an area near livestock or a septic drain-field. Have the water tested at least once a year to make sure it meets the Environmen tal Protection Agency standards for drinking water. The analysis should include a test for E coli and other coli form bacteria that can cause contamination.
+ Surface water (lakes, ponds, rivers and streams) can be polluted by human sewage or animal waste, fertilizers and pesticides from lawns and farm fields, or chemicals from industry and should not be used.
+ Catchment systems, like rain barrels, should be properly located and exclude possible contamination from animals or other sources by using screening and/or lids on openings.

SAFE HANDS

+ It is a good idea to wear gloves when working in the garden. If gloves are used, be sure they are cleaned regularly and stored properly.
+ Whether or not students wear gloves, they should always wash their hands before and after being in the garden. Wash hands in warm, soapy water for at least 20 seconds. Use a fingernail brush to remove particles trapped under the nails.
+ Dry hands with a single use paper towel or automatic hand dryer.

SAFE FOOD IN THE GARDEN

+ Students should not eat anything from the garden unless it has been washed and they are sure it is an actual food. Students should check with an adult before eating any item from the garden.
+ Students should learn which plants have both edible and poisonous parts. For example, only the tomato and not the tomato leaves should be eaten.
+ Be aware that shoes and clothing can transfer contaminants. Roll up sleeves when working in the garden, and

knock off or rinse off soil from shoes/boots before returning to class. Students should also wear proper closed-toe shoes to protect their feet from cuts and stings.

+ No herbicides, fungicides, or insecticides should be used in the garden, or within 25 feet of the garden, except by a licensed pesticide applicator.

+ Deer, rabbits, and groundhogs can devastate vegetable gardens. Birds, squirrels, mice, and raccoons can also become troublesome pests and can leave droppings and waste behind that can become a contaminant. Do not feed wildlife near your garden, and if possible, secure permission, funding, and assistance to erect a fence with a gate. If deer are a problem, the fence needs to be 8 ft. tall. If deer are not a problem, a 4 ft. high fence will suffice. Many types of woven wire and vinyl netting fencing materials are available.

SAFE FOOD AT HARVEST

+ Before and during harvest use clean and sanitized tools, gloves, harvest containers, and work surfaces. Be aware of what hands and tools have touched before moving to another task that involves edible plants, especially picking. Clean and sanitize tools and containers in an area well separated from your vegetable garden. Diluted bleach (1 teaspoon in 4 cups water) or pure white vinegar is safe for sanitizing tools and containers. Always use clean and sanitized containers that are made from materials designed specifically to safely hold food for harvesting. Examples include paper grocery bags, 5-gallon food-grade buckets (new or that held pickles or other food products), colanders or plastic kitchen bowls. Never use plastic garbage bags, trash cans, or any containers that originally held chemicals, such as household cleaners or pesticides.

+ Wash hands before and after picking produce. If using gloves, be sure they are cleaned and stored properly.

+ Brush, shake or rub off any excess garden soil or debris before putting the produce into the harvest container or bringing produce into the kitchen. It is not recommended to wash fruits and vegetables before refrigerating, but to wash them immediately before eating or preparing for cooking. Refrigerating fruits and vegetables with moisture from washing can encourage microbial growth.

+ When washing produce, use cool, running, potable water. Produce with thick skins, like potatoes, can be scrubbed with a vegetable brush to remove excess dirt and bacteria.

+ Fruits and vegetables stored at room temperature (onions, potatoes) should be kept in a cool, dry, pest-free, well-ventilated area separate from chemicals.

+ Handle produce gently to avoid bruising and always cut away damaged parts of fruits and vegetables before eating or preparing. Throw moldy produce away.

+ Always cover and refrigerate cut fruit and vegetables when preparing them in advance.

+ Do not serve cut fruit and vegetables if they have been held for longer than 2 hours at room temperature or longer than 1 hour at temperatures above 90°F (32°C).

SAFE SURFACES FOR FOOD PREP

+ Diluted bleach (1 teaspoon in 4 cups water) or pure white vinegar is safe for sanitizing surfaces, utensils, and containers.

+ Avoid cross-contamination when preparing fruits and vegetables. Clean work surfaces, utensils, and hands before and after handling fruits and vegetables. Let utensils and surfaces air dry.

+ Keep fruit and vegetable bins in the refrigerator clean. Wash and sanitize bins before re-using them. If you store fruits and vegetables in the refrigerator, use a thermometer to check that your refrigerator is at the proper temperature (40°F or less).

CHECKLIST
SUSTAINING YOUR GARDEN

STRENGTHENING THE CONNECTION

+ Reach out to more teachers.
+ Approach "special area" teachers and after-school staff.
+ Discuss with principal and food service manager the possibility of including garden produce in the school meal program or in regular snacks.
+ Reach out regularly to your community online through blogs, email updates and online newsletters, by mail, through articles in the local paper, and other ways of publicizing your garden and staying in touch with stakeholders.

MAINTAINING FUNDING

+ Consider selling garden produce and products to school staff and/or larger community.
+ Consider raising funds during school garden parties, tours, or other celebrations.

FINDING AND KEEPING VOLUNTEERS

+ Recruit volunteers among parents, neighbors, and supportive local businesses and organizations.
+ Provide an orientation for all volunteers.
+ Appreciate volunteers personally and publicly.

EVALUATING YOUR GARDEN PROGRAM

+ Research appropriate evaluation tools.
+ Determine which aspects of the program are to be evaluated, based on original program goals.
+ Discuss evaluation plan with principal, teachers, and food service manager.

EXPANDING YOUR GARDEN CHECKLIST | **CREATIVE POSSIBILITIES**

GARDENING FOR NATIVE POLLINATORS

+ Research types of pollinators in your region and the plants that attract them.
+ Consider allowing some vegetable plants to go to seed.
+ Decide on a garden plan that will allow for perennial plants.
+ Discuss expanding your garden with school administrators and landscaping staff.
+ Understand and share the role of "host plants" with landscaping staff.
+ Look through "Digging Deeper" section for ways to connect students to pollinator conservation projects.

GROWING PERENNIAL FRUIT CROPS

+ Research appropriate fruit trees for your region.
+ Determine area with enough sun and drainage for fruit crop.
+ Seek approval from administrators and landscaping staff.
+ Work with landscaping staff on maintenance plan for fruit crop.

EXPANDING YOUR GARDEN | WEB RESOURCES

EDIS BUTTERFLY GARDENING
http://edis.ifas.ufl.edu/uw057

EDIS GROWING FRUIT IN CONTAINERS
http://edis.ifas.ufl.edu/mg243

USDA PLANT HARDINESS ZONE MAP
http://planthardiness.ars.usda.gov/PHZMWeb/#

EDIS DOORYARD FRUIT VARIETIES
http://edis.ifas.ufl.edu/pdffiles/MG/MG24800.pdf